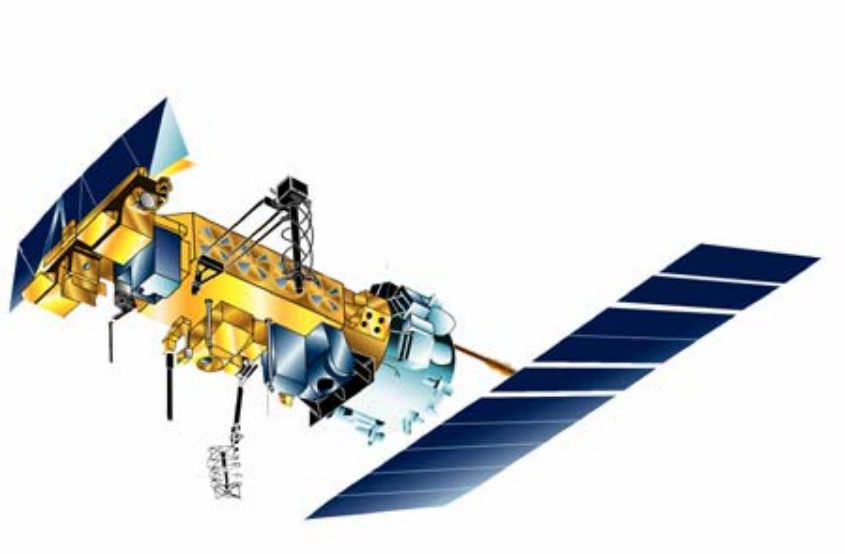
NOAA-N
Mission Readiness Review



Goddard Space Flight Center

March 31, 2005

NOAA-N MRR Agenda

Mission Readiness	----	K. Halterman (POES)
Independent Review Team	----	A. Goldstein (Aerospace) and T. Cygnarowicz (Code 300)
Launch Vehicle	----	D. Breedlove (KSC)
Ground System	----	K. Amburgey (NOAA)
Public Affairs Plan	----	C. O'Carroll (PAO)
Action Items/Conclusions	----	All

MISSION READINESS

K. Halterman
POES Project Manager

Mission Readiness Agenda

- Mission Overview
- Impact of NOAA-N Prime Accident
- Differences from NOAA-M
- Test Like You Fly
- NOAA-N Status
- NOAA-N Residual Risks
- Mission Operations
- NOAA-N Readiness for Launch

MISSION OVERVIEW

Polar Operational Environmental Satellites (POES)

- Joint program between NASA and NOAA
  - NASA, funded by NOAA, procures and launches satellites
  - NOAA performs satellite operations and science data processing/distribution
- Continuous operational program since 1970's
  - Launch schedules determined based on health of on-orbit constellation
- Satellites collect global measurements of the earth's surface and atmosphere
  - Two operational satellites cover entire planet at least 4 times a day
- Primarily used for operational meteorology and environmental studies
  - Science data is continuously broadcast worldwide
  - Science data stored on-board and played back over NOAA ground stations

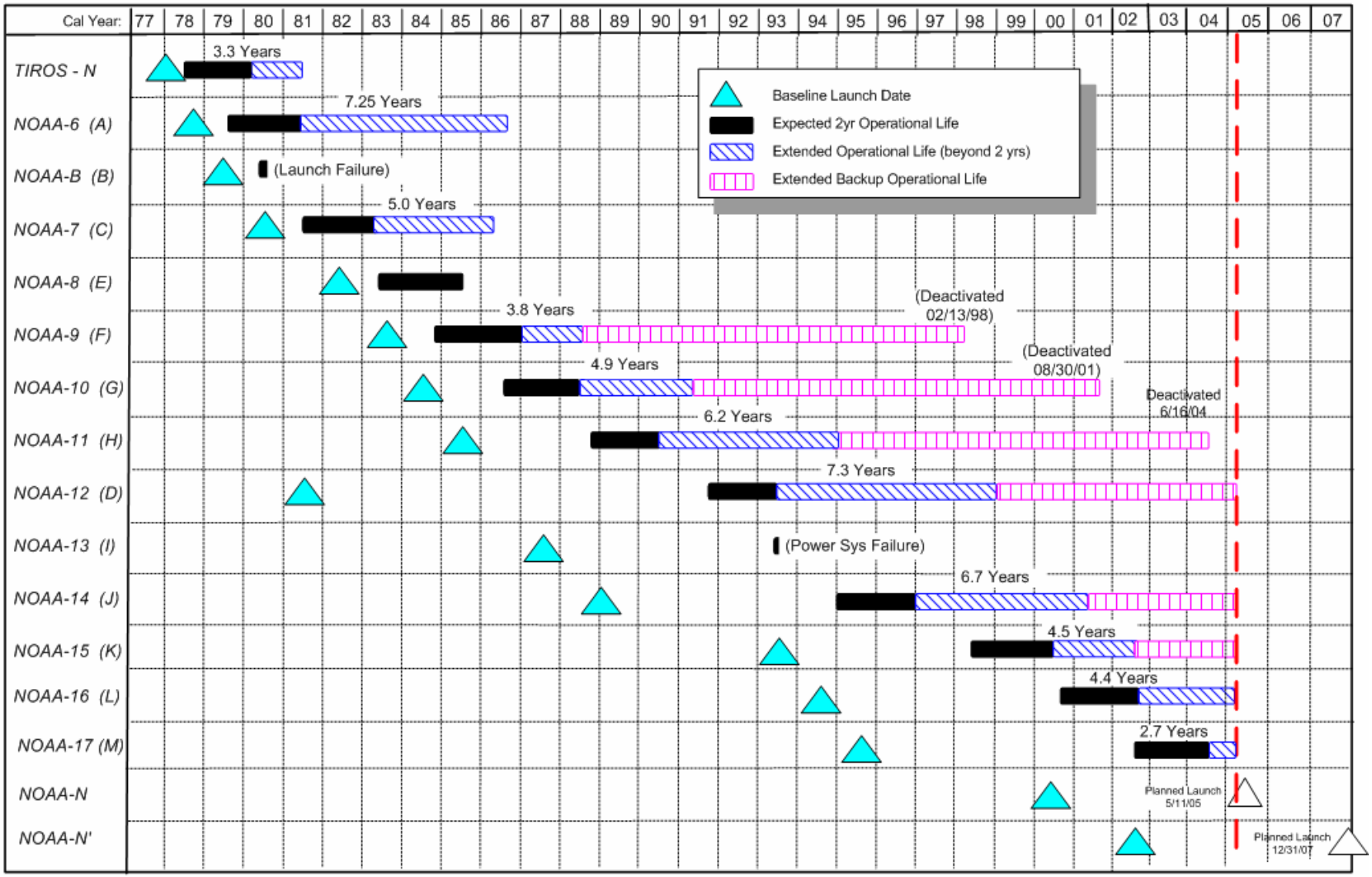
NOAA Constellation Status

- Operational system consists of two satellites
  - 2:00 PM Ascending Orbit - NOAA-16 (launched 9/21/00)
  - 10:00 AM Descending Orbit - NOAA-17 (launched 6/24/02)
- Older satellites continue to provide some useful data
  - NOAA-15 (launched 5/13/98)
  - NOAA-14 (launched 12/30/94)
  - NOAA-12 (launched 5/14/91)
- NOAA-N Launch – May 11, 2005
  - Replaces NOAA-16
  - 2:00 PM ascending orbit (same as NOAA-16)

POES Spacecraft

On Orbit Life

As of: March 2005



NOAA Organizational Responsibilities

National Environmental Satellite, Data, and Information Service (NESDIS)

- Office of System Development
  - POES program management
  - Establish requirements
  - Budget planning
  - Acquisition agent for POES (formerly System Acquisition Office)
- Office of Satellite Operations
  - Performs spacecraft operations in Suitland, MD (POES, GOES, DMSP)
  - Command and Data Acquisition Stations (Wallops, Fairbanks)
  - Provides support for launch and checkout
- Office of Satellite Data Processing and Distribution
  - Performs science data processing and product distribution in Suitland, MD
- Office of Research and Applications
  - Supports calibration and science data evaluation
  - Develops new products

NASA Organizational Responsibilities

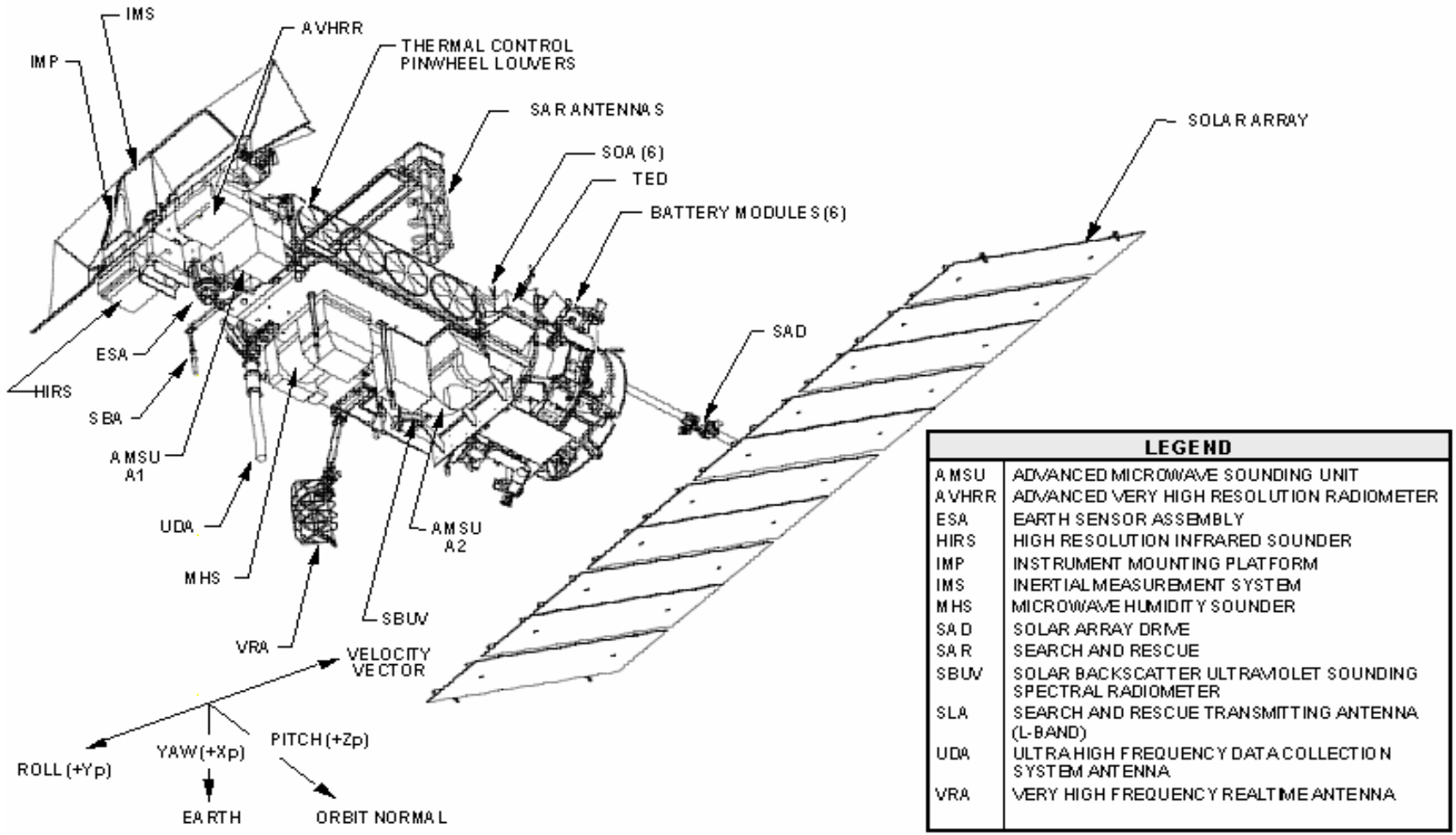
GSFC – Polar-orbiting Operational Environmental Satellites (POES) Project

- Management of all POES activities from procurement through satellite handover to NOAA
  - Spacecraft and instrument build
  - Integration and Test (I&T)
  - Launch Planning and Launch Support
  - On-Orbit Verification
    - Initial spacecraft checkout
    - Handover at Launch plus 21 days of primary spacecraft responsibility to NOAA
    - Completion of On-Orbit Verification at Launch plus 45 days
- Post-handover anomaly support

KSC – Launch Services Program

- Managerial and technical oversight of the Delta II launch vehicle
  - Launch services, systems, processing, and support

NOAA-N On-Orbit Configuration



LEGEND	
AMSU	ADVANCED MICROWAVE SOUNDING UNIT
AVHRR	ADVANCED VERY HIGH RESOLUTION RADIOMETER
ESA	EARTH SENSOR ASSEMBLY
HIRS	HIGH RESOLUTION INFRARED SOUNDER
IMP	INSTRUMENT MOUNTING PLATFORM
IMS	INERTIAL MEASUREMENT SYSTEM
MHS	MICROWAVE HUMIDITY SOUNDER
SAD	SOLAR ARRAY DRIVE
SAR	SEARCH AND RESCUE
SBUV	SOLAR BACKSCATTER ULTRAVIOLET SOUNDING SPECTRAL RADIOMETER
SLA	SEARCH AND RESCUE TRANSMITTING ANTENNA (L-BAND)
UDA	ULTRA HIGH FREQUENCY DATA COLLECTION SYSTEM ANTENNA
VRA	VERY HIGH FREQUENCY REALTIME ANTENNA

NOAA-N Instrument Payload

AVHRR	Advanced Very High Resolution Radiometer - ITT
HIRS/4	High Resolution Infrared Sounder - ITT
AMSU-A	Advanced Microwave Sounding Unit – A1 and A2 - Northrop Grumman (formerly Aerojet)
MHS	Microwave Humidity Sounder - donated by Eumetsat
SEM/3	Space Environmental Monitor - ATC (formerly Panametrics)
SBUV/2	Solar Backscattered Ultraviolet Radiometer - Ball
SARR	Search and Rescue Repeater - donated by Canada
SARP/2	Search and Rescue Processor - donated by France
DCS/2	Data Collection System – donated by France

Mission Objectives

- Collect and disseminate worldwide meteorological and environmental data
  - Provide day and night information (AVHRR)
    - Cloud cover distribution and cloud type
    - Cloud top temperature
    - Moisture patterns and ice/snow melt
  - Provide vertical temperature and moisture profiles of atmosphere (HIRS, AMSU, MHS)
  - Measure global ozone distribution and solar UV radiation (SBUV)
  - Measure proton, electron, and charged particle density to provide solar storm warnings (SEM)
  - Collect environmental data (DCS)
    - Stationary platforms in remote locations
    - Free floating platforms on buoys, balloons, migratory animals
- Provide Search and Rescue capabilities (SARR, SARP)

NOAA-N Success Criteria

- Minimum Success Criteria
  - 2-year spacecraft lifetime
  - 3-year instrument lifetime
  - Functioning primary instruments
    - AVHRR
    - HIRS
    - AMSU-A
- Goal
  - 3 to 5-year lifetime
    - On average, NOAA satellites last 3.75 years
  - All instruments functioning

NOAA-N Build History

- NOAA-N spacecraft boxes built in East Windsor, NJ in 1995-1997
- Boxes shipped to Sunnyvale, CA in 1998
- Instruments delivered in 1998-2000
- Spacecraft assembled in Sunnyvale, CA 1999-2000
- Instrument integration started in 2001
- All environmental testing performed in Sunnyvale
  - Dynamics testing - Fall 2001
  - EMI testing - February 2002
  - Thermal vacuum testing - October 2002
  - Second EMI test - January 2004
    - For MHS EMI fixes and upgraded transmitters
- NOAA-N ready for “call-up” with all instruments repaired and calibrated - August 2004

NOAA-N "Call-Up"

- NOAA sent "call up" letter on May 20, 2004 requesting launch of NOAA-N "as soon as possible"
- In June 2004, launch date set for February 14, 2005 to allow for
  - MHS reintegration and test
  - 6 months launch campaign
  - Deep Impact launch window restrictions
- Launch processing started in August 2004
- In November 2004, launch delayed to March 19, 2005
  - S Band Transmitter (STX)-1 overheating
    - STX-1 replaced
  - Ground Receiver Demodulator (GRD)-2 locked up
    - GRD-2 replaced
- NOAA-N flown to VAFB on January 13, 2005
- In February 2005, launch delayed to May 11, 2005
  - STX-3 out of spec frequency drop
    - STX-3 replaced

Mission Characteristics

- Mission Design Life: 2 years

- Launch
  - Date: 11 May 2005
  - Time: 10:22 GMT (3:22 PDT, 6:22 EDT)
  - Window: 10 minutes
  - Site: Vandenberg AFB (SLC-2)
  - Launch Vehicle: Delta II
  - Liftoff Mass: 3150 lbs

- Orbit
  - Equatorial Crossing Time: 2:00 pm local solar time (north bound)
  - Altitude: 870 km (470 nmi)
  - Inclination: 98.730 degrees (sun synchronous)
  - Orbital Period: 102 minutes

Mission Reliability Concept

- Two operational spacecraft constellation redundant by design
- 2-year spacecraft bus life requirement with no specified probability of success
- 3-year instrument life requirement
- Heritage spacecraft design fully redundant, - proven spacecraft reliability
  - Except for AVHRR (MIRP) and MHS (MIU) data interfaces
- Instruments are non-redundant
- Spacecraft and instrument FMECAs meet heritage contract requirements
  - Lockheed Martin contract signed in 1988
  - FTA not required or performed for spacecraft or instruments
    - FMECA and FTA used in anomaly investigations
- NOAA-N reliability improved compared to previous NOAA satellites
  - No solid rocket motor
  - No Hydrazine propulsion system
  - No tape recorders
  - Improved AVHRR scan motor and S-Band transmitters

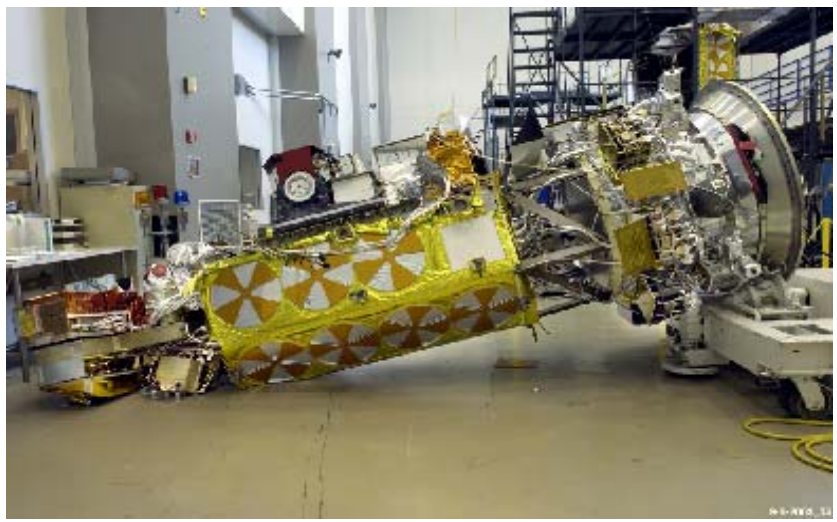
NOAA-N is Class B Mission

- Per NPR 8705.4, NOAA-N is a Class B mission
- Single point failures: SPFs permitted for Level 1 requirements, but mitigated by high reliability parts and additional testing **Yes**
- Engineering model/protoflight hardware for new or modified designs **Yes**
- Formal qualification and acceptance test program at all hardware levels **Yes**
- Parts – class A (Level 1 >B requirement) **Yes**
- Full formal review program **Yes**
- Safety per applicable standards **Yes**
- Use of qualified materials and tested lots of procured items **Yes**
- Mishap Investigation Boards per NPR 8621.1 **Yes**
- Reliability FMEA/CIL at black box level **(spacecraft is mostly redundant)** **Limited**
- System level fault tree analysis. **For anomaly investigations only** **Yes**
- Limited scope probabilistic risk assessment **Yes**
- Maintainability of ground system elements **Yes**
- Formal quality assurance program **Yes**
- Software assurance and IV&V (as determined by AA OSMA) **Yes**
- Risk Management Program **Yes**
- Telemetry coverage during critical events **Yes**

IMPACT OF NOAA-N PRIME ACCIDENT

NOAA-N Prime Accident

- During a spacecraft tilt from vertical to horizontal on September 6, 2003, NOAA-N Prime slid off the turn over cart
- Direct cause of accident was failure to follow the procedure to properly configure the turn over cart
  - 24 bolts to secure the adapter plate to the cart were missing
- NASA Mishap Board also found systemic problems of complacency, poor planning, disregard for safety, lack of configuration control and inadequate government oversight
- Corrective actions have been taken by Lockheed Martin and the government to prevent a similar accident from occurring



Lockheed Martin Corrective Actions

- Space Systems Company wide actions include
  - Relocated Sr. VP (Tom Marsh's Deputy) from Denver to Sunnyvale
  - Reorganized and increased the authority of Product Assurance
  - New initiatives established, such as the Error Prevention Council
  - Closer coordination with DCMA
- TIROS Project actions include
  - Formal training program for I&T team and supervisors
  - Formal I&T operations planning process implemented
  - Configuration control of the mechanical GSE
  - Increased staffing of quality engineers and safety engineers
  - Established effective safety program
  - Monitoring, verifying, auditing I&T activities
  - Video monitoring of I&T operations
  - Disseminate lessons learned
  - Better documentation of procedures and drawings

Government Corrective Actions

- Increased size of resident office staff (both product assurance and engineering) at Lockheed Martin
- Assigned full time civil servant to manage in-plant resident office
- More oversight of Lockheed Martin I&T by GSFC
- More review of Lockheed Martin I&T procedures by GSFC
- Closer involvement with DCMA
  - Revised DCMA Letter of Delegation
  - DCMA has more responsibility
  - More NASA interaction with DCMA
  - Clarified roles and responsibilities of NASA and DCMA
- Stronger system safety program at GSFC
  - More system safety engineers
  - Greater involvement in oversight of Lockheed Martin I&T and system safety
  - Address all facets of I&T, not just focus on launch safety
- Increased monitoring, trending, and auditing of Lockheed Martin's I&T activities
- Periodic independent reviews of the POES Project

How Do We Know That NOAA-N is Good?

NOAA-N Prime accident was not a flight hardware failure
NOAA-N was extensively tested and reviewed since the corrective actions were implemented

DIFFERENCES FROM NOAA-M

Mini Block Change

- NOAA-N is a mini block change from NOAA-KLM
  - Instrument changes
    - New and modified instruments
  - Spacecraft changes
  - Launch vehicle change
- All changes were designed and reviewed prior to implementation
- NOAA-N is fully documented
  - Spacecraft subsystem requirements documents completed
  - Requirements verification on schedule for completion in April
  - Design documentation completed
  - As built configuration documented
- All changes were verified through full test program

Microwave Humidity Sounder (MHS)

- Donated by Eumetsat as part of the Initial Joint Polar System agreement between NOAA and Eumetsat
- Manufactured by Astrium, Portsmouth, UK
- 5-channel microwave total power radiometer
  - Operates in the 89 GHz to 190 GHz region
  - Provides information on atmospheric water vapor
- Scans earth every 8/3 seconds, synchronized to AMSU-A
- Produces similar science as AMSU-B which it replaces
- Generates CCSDS telemetry packets
- Returned to Astrium twice after thermal vacuum testing
  - EMI problem
  - Channel 2 problem

Other Significant Instrument Changes

- HIRS/4
  - 10 km FOV instead of 20 km for better visibility through holes in clouds
    - Same sample rate as HIRS/3 (view ¼ of area compared to HIRS/3)
  - Same filter wheel motor as on NOAA-KLM
    - NOAA-15 HIRS had problems 1.5 years after launch, NOAA-15 HIRS had higher jitter in ground tests than the other HIRS
    - NOAA-16 HIRS problems started > 4 years after launch
    - NOAA-N HIRS has high motor torque margin, expected to perform well
- AVHRR
  - More powerful brushless DC scan motor replaced hysteresis motor
    - Corrects problems on NOAA-15 and NOAA-16 AVHRRs
  - Successful life test (> 5 yrs) performed on new motor
- AMSU-A
  - Same design as NOAA-KLM AMSU-As, but has some new suppliers and connectorized harnesses in lieu of point to point electrical wiring
    - NOAA-N AMSU-A1 has different power supply vendor and improved electrical wiring compared to failed NOAA-17 AMSU-A (due to short on –15V power line)

Spacecraft Changes from NOAA-M

- * Launch vehicle change to Delta II
- Replaced AMSU-B with Microwave Humidity Sounder (MHS)
  - * MHS Interface Unit developed
- *Ring Laser Gyro / Inertial Measurement System (IMS)
  - Upgraded due to unavailability of mechanical IMU previously used
- 3 Solid State Recorders (SSR) replaced 5 tape recorders
  - One SSR flew on NOAA-M
- * Flight software changes
- *S Band Transmitter improvements
  - New Trak oscillator, lowered power output
- Minor changes
  - Frequency change on Automatic Picture Transmission (APT) transmitter
  - CPU bootstrap Read Only Memory (ROM) upgrade
  - Signal Conditioning Unit (SCU) modifications for thruster changes
  - Cross Strap Unit (XSU) upgrades for parts obsolescence
  - Harness changes corresponding to other hardware changes

* More detail on following charts or in Residual Risk section

Launch Vehicle Change Impact

- Change from Titan II to Delta II
- Deleted Apogee Kick Motor (AKM), hydrazine system and 100 lbf Reaction Engine Assemblies (REA)s
- Added new payload adapter and incorporated separation springs
  - Payload adapter has Landsat 7 heritage
- Added new cold gas reaction control system with dual-seat Nitrogen Engine Assemblies (NEA)s
- Deleted flight software that controlled AKM ascent and deployments
- Developed new flight software module to control separation, acquire Earth, conduct deployments
- Longer duration for ascent phase exposes some deployment mechanism hinges to larger temperature extremes required retest and requalification
- Modifications required to structure, reaction control system, and harnesses
- Delta II Launch Vehicle Integration with KSC and Boeing started in March 2001
  - Detailed planning performed during 4 years
  - Detailed Main Engine Cut Off (MECO) analysis and testing on NOAA-N Prime show no spacecraft or instrument issues
  - Recent beacon transmitter e-field issue resolved; NOAA-N will not radiate beacon while in fairing
- All changes fully verified by test or analysis
  - Pathfinder conducted at VAFB in August 2004 verified electrical/power interfaces

MHS Interface Unit (MIU)

- Interfaces MHS into NOAA-N command and data handling system
- Consists mainly of 1750A processor
- Provides 1553B bus used by MHS
- Interfaces to spacecraft computers and telemetry processors
- Converts MHS CCSDS data packets into the NOAA-N Time Division Multiplex (TDM) telemetry for downlink
- Converts NOAA-N single word uplink commands into CCSDS command packets used by MHS

Flight Software Changes

- Deleted Titan II Ascent Guidance Software
  - Steered AKM with hydrazine thrusters and performed deployments
- Added Delta II ascent software
  - Different liftoff detection and separation times, Delta II initiated separation
- Added deployment module
- Changed mechanical IMU to ring laser gyro IMS
  - Different gyro interface in controls algorithms
  - Modified redundancy management
- Updated safe state table definition
- Added MIU interface
  - MIU and MHS memory loads
- Flight Software Testing
  - All flight software was tested by Lockheed Martin with flight computer hardware-in-the-loop test bed
  - Formal IV&V by GSFC – over 100 tests run for each flight software release on software emulator

Design Reviews of New/Modified Spacecraft Hardware

• S Band Transmitter PA Change Design Review	August 20, 2003
• MHS Interface Unit (MIU) Harness Design Review	January 29, 2003
• S Band Transmitter Oscillator Change CDR	February 19, 2002
• Delta II Launch Support Equipment CDR	November 27, 2001
• Delta II Launch Support Equipment PDR	September 6, 2001
• System Design Review of NOAA-N	February 25-26, 1999
• Flight Software CDR	December 9-10, 1998
• CPU PROM Upgrade Design Review	November 13, 1997
• Vertical Transport Enclosure CDR	November 13, 1997
• Solid State Recorder CDR	September 23, 1997
• Inertial Measurement System CDR	August 27, 1997
• Mechanical Subsystem CDR	August 21, 1997
• NOAA-NN' Spacecraft for Delta II Launch CDR	August 14, 1997

Design Reviews of New/Modified Spacecraft Hardware, cont.

• Solid State Recorder PDR	February 25, 1997
• Software Development and Verification Facility CDR	February 12, 1997
• Propulsion System CDR	November 27 1996
• Inertial Measurement System PDR	October 22, 1996
• 40 AH Battery CDR	July 23, 1996
• MIU Hardware and Firmware CDR	June 26-27, 1996
• Signal Conditioning Unit CDR	June 18, 1996
• 40 AH Battery PDR	May 3, 1996
• Signal Conditioning Unit PDR	May 2, 1996
• Propulsion System PDR	April 10, 1996
• Solid State Recorder Concept Review	April 4, 1996
• MHS Interface Unit (MIU) Firmware CDR	March 29, 1996
• MIU Software Requirements Review	November 9, 1995
• MIU PDR	September 20, 1995

Test Like You Fly

NOAA-N Test Flow

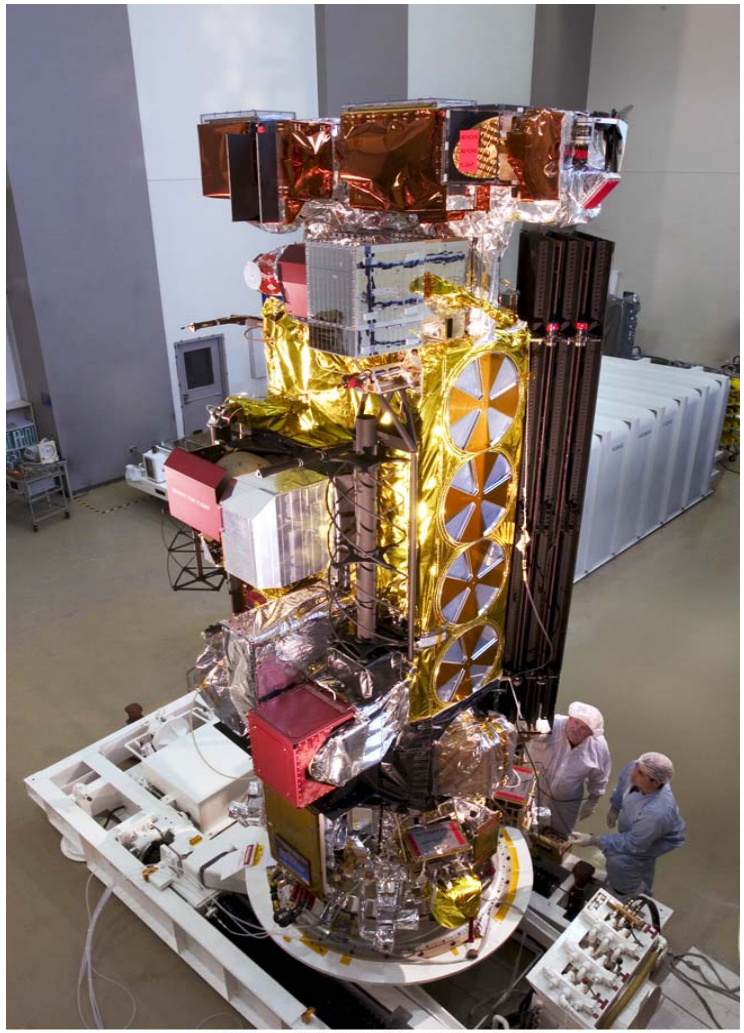
- Classical environmental test flow based upon knowledge and experience gained from previous satellites (KLM)
- Structured buildup of the spacecraft bus with acceptance test prior to instrument integration
- Comprehensive 3-week System Electrical Performance Evaluation Test (SEPET) performed as baseline and repeated at least eight times throughout the testing process
- Test program emphasized verification of new or redesigned parts
- Environmental testing based on Delta II launch vehicle included:
  - Modal test
  - Three axis vibration and acoustics in flight configuration on the Payload Adaptor Fitting (PAF)
  - Pre- and Post Dynamics pyro initiated deployments
  - Thermal Vacuum/Thermal Balance
  - EMI, EMI (twice)
  - NOAA-N subjected to Protoflight levels

Component/Instrument Removals After Environmental Testing

- NOAA satellites are designed for storage before launch
  - All deployables are designed for removal, storage, and replacement
  - Some instruments must be calibrated at vendor's site prior to launch
- Problems with the on-orbit NOAA constellations or other instruments in test can lead to repairs on the ground
  - All S-band transmitters were reworked and reacceptance tested as a result of on-orbit problems
- Amount of box/instrument removal on NOAA-N comparable to NOAA-M
- MHS removed for rework twice, reacceptance tested prior to final install
- Components are reinstalled with complete Initial Power Functional and Detailed Electrical Testing
- STX-1, GRD-2 replaced before launch site SEPET
- STX-3 replaced after launch site SEPET
  - NOAA-N aliveness test performed with new STX-3
- New STX-1 and STX-3 box level EMI test results compared to removed STXs – no issues found

NOAA-N STATUS

NOAA-N at Vandenberg AFB



ITAR CONTROLLED DATA

NOAA-N Launch Flow Timeline

"Call up" processing starts	8/13/04	Complete
Pre-ship SEPET	11/2/04	Complete
Decision to replace STX-1/GRD-2	11/4/04	Complete
Rework complete	12/1/04	Complete
Spacecraft Ship to VAFB	1/13/05	Complete
Pre-launch SEPET	2/04/05	Complete
Decision to replace STX-3	2/14/05	Complete
Launch Vehicle Mate	4/20/05	
Mission Dress Rehearsal	5/06/05	
Launch	5/11/05	

Launch Review Status

NOAA Instrument Peer Review	9/23/04	Complete
IIRT* Pre-ship Review	11/9-10/04	Complete
IIRT Delta Pre-ship Review	1/04/05	Complete
KSC LV LRR	1/26/05	Complete
MRR	3/31/05	
SMARR	4/22/05	
SMD AA Summary MRR	4/28/05	
FRR	5/5/05	
LRR	5/9/05	

*Code 300 and Aerospace

Paperwork Status

• Pre-Ship Review Requests for Action	- Completed
• NSPAR's	- All approved
• Non Conformance Reports	- No issues 2 NCs awaiting paper closure
• Waivers	- All approved
• Unverified Failure Reports	- All closed
• GIDEPS	- No issues

Software Independent Verification and Validation

- NOAA-N Flight Software
  - Developed by Lockheed Martin
    - Based on NOAA-M software
      - Code related to Kick Motor control deleted
      - New deployment modules
      - New MHS interface
  - Verified by Lockheed Martin
    - Executed code on hardware-in-the-loop test bed
  - Formal IV&V completed by GSFC/QSS
    - Executed code on software emulator
- NASA IV&V facility agreement in 2002
  - Since NOAA-N software was fully developed and had been formally IV&Ved, no West Virginia IV&V required
  - Documented through email exchange

NOAA-N Orbital Debris Assessment

- Performed to NASA Safety Standard NSS 1740.14, Guidelines and Assessment Procedures for Limiting Orbital Debris
- No payload debris released during staging, payload separation, payload deployments
- No debris released during mission operations
- No explosions expected from on board stored energy sources
- Probability of colliding
  - With man-made, large debris or meteorites is 2.4×10^{-4} (lower than 1×10^{-3} guideline)
- Post mission disposal
  - Orbital lifetime is 501 years
  - Passivation will consist of venting any remaining GN2, turning off battery chargers, transmitters, reaction wheels
- NOAA-N ODA initially submitted in September 2003
- Comments received in November 2004
- ODA resubmitted in January 2005

National Agency Checks

- Required for NASA contractors that will support hands-on operations at Suitland, MD satellite control center
- NOAA-N On-Orbit Verification team consists of GSFC civil servants and
  - Lockheed Martin Sunnyvale
  - GSFC support contractors
    - QSS, Swales, Orbital, SGT, MEI
- NACs completed for all contractors needed to support NOAA-N On-Orbit Verification
  - More than 80 contractors approved

Environmental Impact

- NEPA Environmental Checklists submitted to GSFC's Safety and Environmental Division
- NOAA-N is routine payload with no unusual environmental issues

NOAA-N Contingency Plan

- NOAA-N Contingency Plan prepared according to NPR 8621.1A
- Contains names and phone numbers of individuals to contact in the event of mishaps
- Identifies pre-designated Mishap Investigation Board chairman
  - David Spencer of Navy Research Laboratory
- Contingency Plan in approval cycle

NOAA-N Residual Risks

Residual Risk Items

- STX - S-Band Transmitter (STX) Issues
- AMSU - Advanced Microwave Sounding Unit (AMSU)-A1 Radiometric Counts
- RLG - Ring Laser Gyro (RLG) Laser Intensity Module
- GRD - Ground Receiver Demodulator (GRD) Unverified Failure
- MHS - Microwave Humidity Sounder (MHS) EMI and Channel 2 repairs
- DII - Delta II new launch vehicle
- TLYF - Test Like You Fly

NOAA-N Residual Risks

Probability	Impact					
	1	2	3	4	5	
5						High
4						Medium-High
3						Medium
2		STX	AMSU			Low-Medium
1		RLG, GRD	MHS	DII, TLYF		Low
	None	Loss of Redundancy	Loss of Some Data	Significantly Degraded Mission	Loss of Mission	

S-Band Transmitters (STX)

- Problems
  - 1) STX degradation and failure on NOAA, DMSP satellites over several years
    - Due to TRAK oscillator output filter degradation, Q4 output transistor overstress, output isolator degradation
  - 2) STX-1 overheating during pre-ship testing in Sunnyvale in November 2004
    - Root cause was anomalous telemetry thermistor
  - 3) STX-3 frequency drop at VAFB in Feb 2005
    - Root cause was crack in the crystal in the oscillator
- NOAA-N approach
  - 1) Reworked STXs for new capacitors, lowered output power to Q4 (still in spec), replaced isolators - full STX ATP and EMI test on spacecraft
  - 2) & 3) Replaced STX-1, STX-3 with qualified spares (caused launch delays); both have > 300 failure free hours operation
- Low risk to mission
  - Redundancy – fly 4 STX, full mission with 3, reduced Local Area Coverage with 2
  - NOAA SOCC enhancing scheduling software for new Solid State Recorder capability
  - Improvements enhance STX reliability

AMSU-A1 Radiometric Counts

- Problem
  - AMSU-A1 S/N 107 on Metop-2 had occasional jumps in channel 7 radiometric counts at ambient temperature and warmer
  - Root cause was intermittent ground in DC/DC converter causing noise emissions that resulted in jumps in both radiometric and calibration counts
- NOAA-N approach
  - AMSU-A1 S/N 109 Fly As Is
    - NOAA-N AMSU-A1 test history has no jumps
    - EOS AMSU-A1 (same build set) has no jumps
    - NOAA-N operating temperature lower than temperature where anomaly occurred
    - NOAA management reviewed GSFC recommendation and concurred
- Low risk to mission
  - Worst problem would be loss of one scan line data during jump
    - Calibration data jump with earth data; all data can be processed at new level
  - NOAA ground software workaround for jumps has been implemented

Ring Laser Gyro Laser Intensity Monitor

- Problem
  - Gyro failures on airplanes and one satellite have been traced to rapid degradation of the Laser Intensity Monitor (LIM) current
  - Most probable cause according to Honeywell is mirror imperfections, increasing cavity loss, and reducing laser intensity
- NOAA-N Approach
  - Fly existing gyros
    - Honeywell screened gyros for high initial LIM (good mirrors prior to degradation)
    - NOAA-N gyros are temperature controlled which slows degradation
    - NOAA-N gyros are filled to a lower pressure which last longer than current product deliveries
    - Each gyro set predicted to greatly exceed mission life
- Low risk to mission
  - Full redundancy
  - No degradation of redundant unit while off
  - Independent review held at Honeywell by GSFC experts on 2/8/05
    - Concurred with Honeywell's recommendation and lifetime predictions

Ground Receiver Demodulator

- Problem
  - During pre-ship testing, GRD-2 exhibited low AGC during End-to-End Test with NOAA control center
  - Under local GSE control, it was unable to achieve relock to nominal AGC
  - Problem could not be repeated either on spacecraft or at vendor L3 Conic
  - Unverified failure report completed
    - Most probable cause is receiver locked on to sideband during anomalous performance of ground command rack (aging racks have known problems)
- NOAA-N approach
  - Replaced GRD with fully qualified spare (caused launch delay)
- Low risk to mission
  - Full redundancy
  - More than 300 failure free hours of operation

MHS EMI and Channel 2 Rework

- Problems
  - MHS (first flight instrument) was returned twice to vendor Astrium
    - 1) Conducted interference with Search and Rescue, emitted interference with AMSU-A2, and thermal vacuum switch fault
    - 2) Channel 2 science failed (caused launch delay)
- NOAA-N Approach
  - 1) EMI problems
    - MHS returned to vendor in Jan 2003 for EMI hardening and switch fault problem
    - Lockheed Martin built new spacecraft MHS harness to prevent conducted EMI
    - Verified through second NOAA-N EMI test and comprehensive performance testing (switch fault was not related to thermal vacuum environment)
  - 2) Channel 2 problems
    - MHS returned to Astrium in March 2004 for repair and test
    - Reintegrated and retested on spacecraft
- Low risk to mission
  - Performance has been nominal since last integration on NOAA-N in July 2004
  - Instrument changes not sensitive to vacuum

New Delta II Launch Vehicle

- Issue
  - Delta II is new launch vehicle for NOAA-N
  - NOAA-KLM launched on Titan II, previous NOAA satellites on Atlas-E
- NOAA-N approach
  - Spacecraft design changed
    - Eliminated Apogee Kick Motor and hydrazine propulsion system used for steering
    - Added new payload adapter and separation springs
    - Added new cold gas reaction control system
    - Deleted flight software that controlled ascent
    - Added new flight software for separation and deployments
  - Launch vehicle integration planning with KSC/Boeing for 4 years
  - MECO testing and analysis showed no issues for NOAA-N
- Low risk to mission
  - All changes fully qualified by analysis and/or test
  - Electrical/power pathfinder executed at launch pad in August 2004
  - Delta II provides direct insertion to orbit
    - No need for risky solid rocket motor and hydrazine propulsion system
  - NOAA satellites successfully switched launch vehicle before

Test Like You Fly

- Issue
  - IIRT concerned that several spacecraft boxes and instruments were removed and reinstalled or replaced after environmental testing
- NOAA-N Approach
  - Classical test flow at qualification levels based on Delta II environment
    - Modal test, 3 axis vibration and acoustics in flight configuration, pre and post dynamics pyro initiated deployments, thermal vacuum/thermal balance, two EMI tests
  - Comprehensive 3 week electrical performance test repeated 8 times during I&T
- Low risk to mission
  - NOAA satellites designed to be placed in storage with instruments and boxes removed for calibration and/or storage
  - Problems with on-orbit satellites or instruments in test lead to repairs
    - These fixes improve the probability of mission success
  - Amount of box removal on NOAA-N comparable to NOAA-M
  - All units, except STX-3, tested in post ship comprehensive test
    - STX-3 has > 300 hours of failure free operation
    - Component level STX-3 (and STX-1) EMI testing compared favorable to replaced STX-3

MISSION OPERATIONS

NOAA-N Post Launch Checkout

- NASA is responsible for the activation and checkout of NOAA-N
  - Conducted from a dedicated Launch Control Room at the Suitland SOCC
  - Joint NASA and NOAA operation per MOU
  - Performance of each spacecraft subsystem and instrument is tested
  - NASA presents results 4 months after launch, prepares detailed report
- First 21 days after launch
  - NOAA provides hands-on SOCC console operations
  - NASA and NASA contractors provide 24-hr/day engineering coverage
    - Monitor spacecraft health and safety
    - Execute activation sequence and On-Orbit Verification (OV) tests
    - Execute Contingency Operations Procedures (COPs), if needed
- At 21 days
  - NASA's NOAA-N spacecraft responsibility is handed over to NOAA
- Between 21 and 45 days after launch
  - NASA continues checkout of NOAA-N
    - Instrument vendors present for instrument activation and testing
- After 45 days – NASA completes NOAA-N On-Orbit Verification testing, presentation and final report

Flight Operations Team for NOAA-N Checkout

- NASA
  - GSFC civil servants
  - GSFC support contractors
  - Lockheed Martin
    - Same Sunnyvale team that launched NOAA-M
  - Instrument Vendors

- NOAA
  - Civil servants perform direct, hands-on console operation of all POES satellites
    - Interface to NOAA ground stations
    - Send all commands
  - SOCC engineering, scheduling, data technicians, etc.
  - Engineering support contractor

Flight Operations Team Training

- Flight Operations Team Briefing
  - At NASA (9/15/04), Lockheed Martin (10/05/04), NOAA (10/28/04)
- SOCC workstation familiarity sessions
  - Hands on at NASA (10/21-22/04), NOAA (11/8-10/04), Lockheed Martin (10/6/04)
- Contingency Operations Procedure (COP) reviews
- On-orbit satellites are used for some training
- Dynamic mission simulator
  - Spacecraft subsystems are simulated with high fidelity, limited instrument science data, can introduce anomalies
- Different types of simulations
  - Engineering (11/15/04, 11/16/04, 12/8/04, 1/12/05, 3/17/05)
  - Instrument (2/8/05, 2/9/05)
  - Network (2/3/05, 3/3/05, 4/28/05)
  - Mission Dress Rehearsal with Lockheed Martin
    - Simulations at the SOCC (1/13/05, 4/13/05, 5/9/05)

Planning for NOAA-N Checkout Completed

- NOAA-N activation sequence pre-planned
  - Flight Time Table defines 45-day orbit-by-orbit sequence of events
- OV tests are defined
  - Test description - what is tested
  - Analysis plan - how to evaluate the test
  - Command procedures developed and tested where needed
- NOAA-N data bases prepared and validated
- NOAA-N Contingency Operations Procedures prepared
  - COPs available for each instrument, subsystem, overall spacecraft and ground system
  - Tested on simulator
- 3 End-to-End tests run with NOAA-N
  - SOCC commanding NOAA-N and receiving telemetry
  - Last End-to-End test was run on January 21, 2005

Launch Good Day/Bad Day

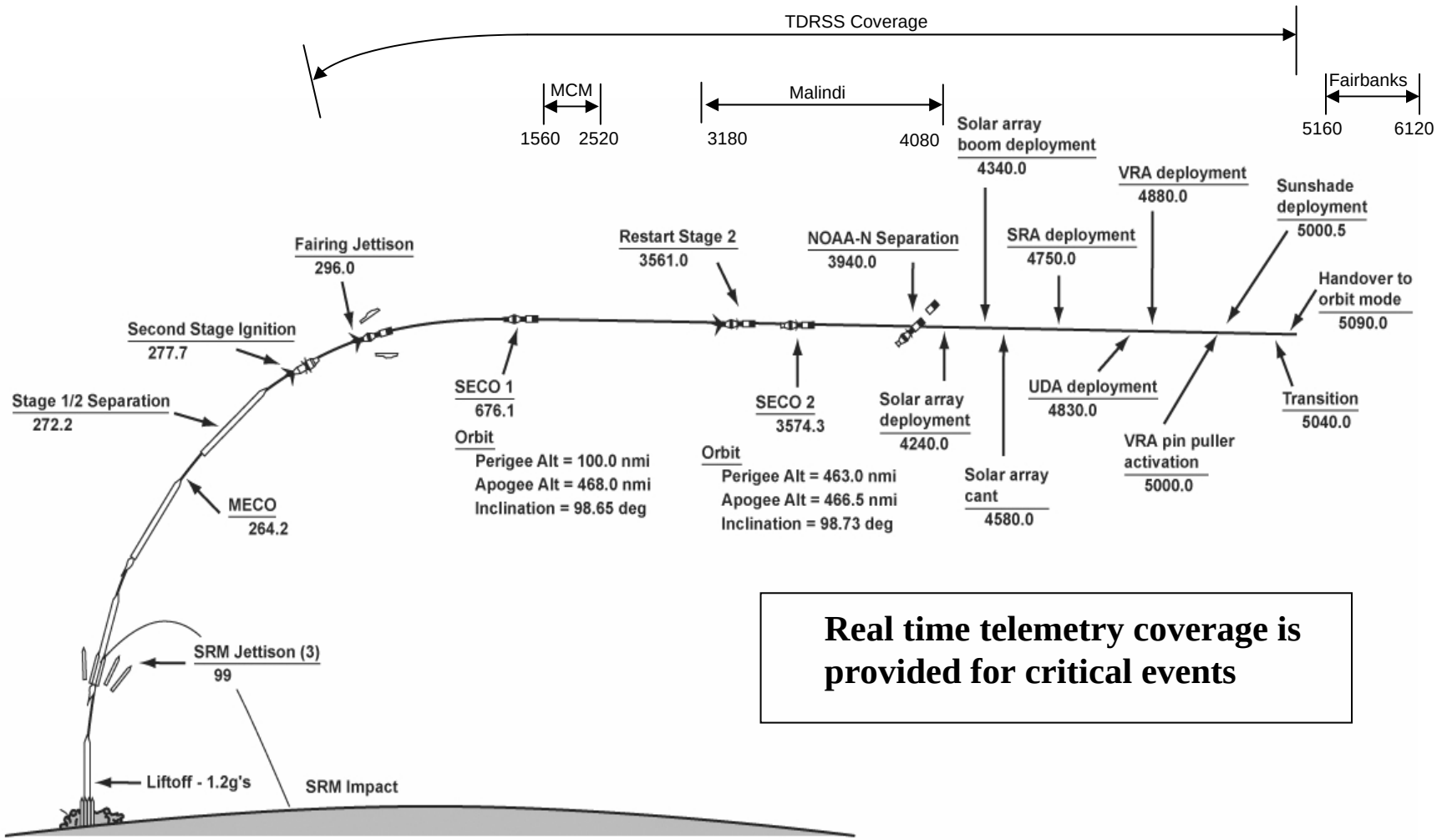
- Command and Data Acquisition (CDA) sites cannot conduct 2-satellite simultaneous operations due to a limitation of personnel and hardware
- Launches into the same orbit are scheduled to provide a separation time (CDA/AOS) of 25 minutes
- To identify these “good days” for launch, a CDA contact time conflict analysis is performed
- “Good days” eliminate conflicts in the early phase of the newly launched spacecraft so that data from the operational spacecraft (NOAA-16) and NOAA-N can be obtained

NOAA-N "Good" Launch Dates

May 2005

S	M	T	W	T	F	S
1	(2)	(3)	(4)	(5)	6	7
8	9	(10)	(11)	(12)	(13)	(14)
15	16	17	18	(19)	(20)	(21)
(22)	(23)	24	25	26	27	(28)
(29)	(30)	(31)				

Ascent Profile



NOAA-N READINESS FOR LAUNCH

Summary

NOAA-N will be ready for launch on May 11, 2005

INDEPENDENT REVIEW TEAM REPORT

A. Goldstein/Aerospace
T. Cygnarowicz/Code 300

NOAA-N Integrated, Independent Review Team

MRR-Summary Report

31 March 2005

IIRT Co-Chairmen

Allen Goldstein

The Aerospace Corporation

Thomas Cygnarowicz

GSFC Code 301

ACRONYMS

• ACS	Attitude Control System
• AKM	Apogee Kick Motor
• DMSP	Defense Meteorological Satellite Program
• DTR	Digital Tape Recorder
• ESM/RSS	Equipment Support Module/RCE Support Structure
• GRD	GSTDN Receiver/Demodulator
• IIRT	Integrated Independent Review Team
• IMU	Inertial Measurement Unit
• MIMU	Miniature Inertial Measurement Unit
• SEPET	System Electrical Performance and Evaluation Test
• SCU	Signal Conditioning Unit
• SSA	Sun Sensor Assembly
• SSE	Sun Sensor Electronics
• STX	S-Band Transmitter
• VTX	VHF Real-Time Transmitter

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Outline

- Background
- Review Observations/Findings
- Areas of Risk
- Summary and Recommendations

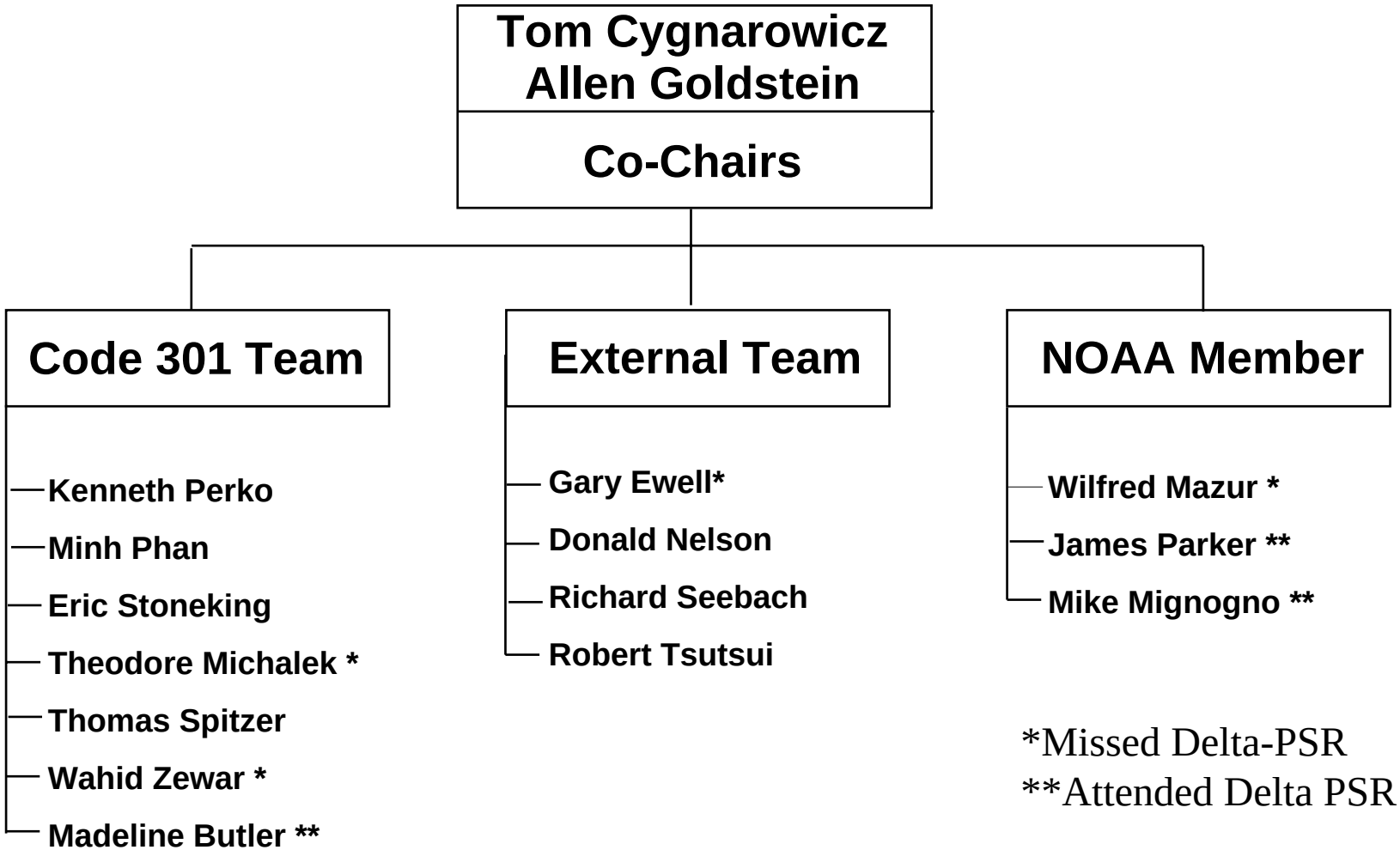
Integrated Independent Review Team Charter

- Independently assess
  - Readiness of spacecraft and primary instruments to enter into spacecraft level environmental test and to ship to the launch site
  - Mission state-of-readiness at spacecraft shipment
- Identify areas of risk and recommend mitigation actions

Reviews for NOAA-N

- IIRT reviews
  - Spacecraft Pre-Environmental Review – Aug 2001
  - Spacecraft Pre-Ship Review – Nov 2004
  - Delta-PSR – Jan 2005
- All instrument reviews were conducted by Code 301 Systems Review Office
- System Design Review was conducted by POES Project in Feb. 1999
  - Included reviewers independent of POES Project

NOAA-N IIRT Composition
Pre-Ship Review



*Missed Delta-PSR
**Attended Delta PSR

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NOAA-N IIRT Review Scope

- Changes to components/subsystems – emphasizing qualification and system testing of first flight items
- Adequacy of testing and acceptability of results
- Mission design and software changes
- Subsystem/system status, performance margins and readiness to continue in flow
- Disposition of problems/anomalies, including those on similar hardware
- Resolution of test discrepancies, flight anomalies and unconfirmed ground anomalies
- LV interfaces, transportation, GSE, and planned S/C activities at VAFB
- Process and mission assurance changes since NOAA N-prime mishap

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NOAA-N Mission Success Criteria

- Acceptable mission orbit (1400 – ascending node)
  - Altitude: 470 nmi
  - Sun Sync incl: 98.730 deg
- Mission design lifetime
  - Spacecraft – 2 years (Goal 3 yrs +)
  - Primary Instruments – 3 years
- Primary instruments
  - Advanced Very High Resolution Radiometer (AVHRR)
  - High Resolution Infrared Radiation Sounder (HIRS)
  - Advanced Microwave Sounding Unit (AMSU-A1/A2)
- Functioning data collection and distribution capability

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IIRT Principal Observations

- Significant hardware and software changes from NOAA-M spacecraft--mini block change
  - Most due to direct inject by Delta II LV, addition of MHS/MIU and component upgrades
  - Some improvements made to avoid repeat of NOAA 16 and 17 on-orbit anomalies
  - All changes have been adequately qualified and tested – assessed as low flight risk
- STX-1 and GRD-2 anomalies occurred during initial pre-ship testing and missing cable mod was identified in final audit
- Discrepant hardware was replaced and final factory testing satisfactorily completed with no significant open items
  - Test results and trends are nominal

IIRT Principal Observations-2

- STX-3 transmitter frequency dropped 60 KHz during testing at VAFB
  - Anomaly was thoroughly investigated
  - Found to be due to crack in crystal oscillator
- Transmitter was replaced with recertified spare unit and all regression testing was satisfactorily completed
- LM improved their focus on mission success and mission assurance oversight after the NOAA N-prime mishap
- Performance margins are adequate
- Residual risk areas were identified and assessed

LM Changes Since NOAA N' Mishap

- Systems Engineering empowered as driving force on program-Increased focus on mission success
  - Break of configuration approval
  - Hardware certification and requirements verification
- I&T processes and discipline enhanced and enforced
  - Training and certification implemented
  - Procedure review and signoff with pre-test team meetings
  - MAGE and ESGE design certification and control
  - Cleanliness enhanced and walk downs performed
- Enhanced Safety and Quality presence and authority
  - Prevented ambiguous paper from reaching floor
  - Employs operational hazards safety analyses
- Greater corporate mission assurance oversight

Improvement process continuing

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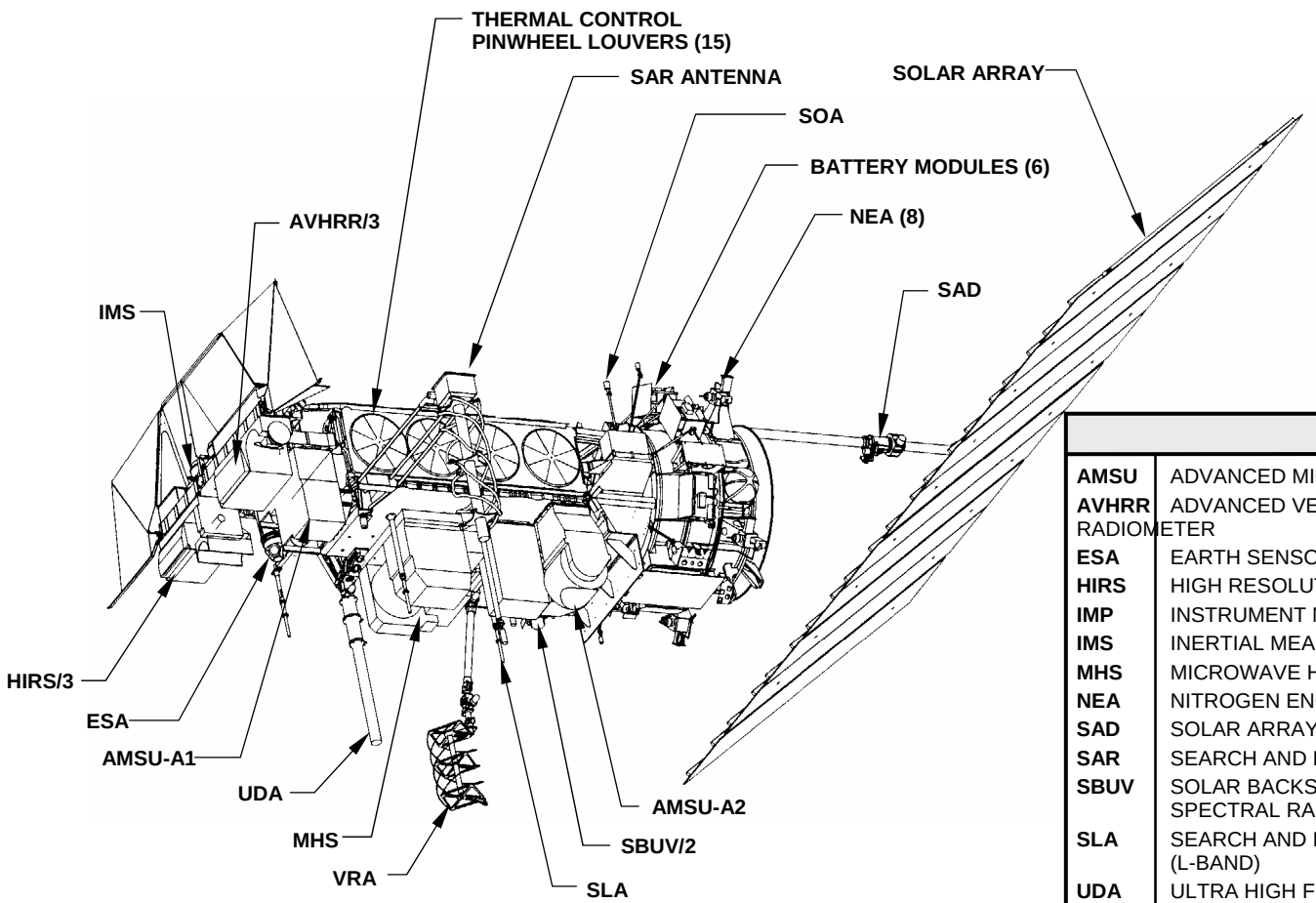
NOAA-N On-Orbit Configuration



LEGEND	
AMSU	ADVANCED MICROWAVE SOUNDING UNIT
AVHRR	ADVANCED VERY HIGH RESOLUTION RADIOMETER
ESA	EARTH SENSOR ASSEMBLY
HIRS	HIGH RESOLUTION INFRARED SOUNDER
IMP	INSTRUMENT MOUNTING PLATFORM
IMS	INERTIAL MEASUREMENT SYSTEM
MHS	MICROWAVE HUMIDITY SOUNDER
NEA	NITROGEN ENGINE ASSEMBLY
SAD	SOLAR ARRAY DRIVE
SAR	SEARCH AND RESCUE
SBUV	SOLAR BACKSCATTER ULTRAVIOLET SOUNDING SPECTRAL RADIOMETER
SLA	SEARCH AND RESCUE TRANSMITTING ANTENNA (L-BAND)
UDA	ULTRA HIGH FREQUENCY DATA COLLECTION SYSTEM ANTENNA
VRA	VERY HIGH FREQUENCY REALTIME ANTENNA

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Major Design Changes NOAA-M to -N

- Eliminated AKM and hydrazine propulsion system
  - Direct orbit injection by Delta II launch vehicle
- Changed nitrogen cold gas ACS, eliminated hydrazine
- MHS replaced AMSU-B instrument
  - MHS Interface Unit (MIU) added for command, telemetry and science data interface to MHS
- Honeywell RLG MIMU's replaced mechanical IMU
- Two solid state recorders replaced 4 DTRs
- S-Band transmitters upgraded via TRAK oscillator replacement and reduced power output mod
- Electrical harness and flight S/W modifications for MIMU and MHS/MIU
- DEPLOY mode S/W functionality replaced ascent guidance software

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Other Design Changes NOAA-M to –N

- New payload adapter (Landsat 7 heritage)
  - Added separation springs
- Separation break-wire circuits added to enable ACS and deployment sequence
  - Sep signal initiated from LV
- SCU mods for thruster changes and producibility
- Cross-strap unit modified to move +5 V filter board inside
- ESM/RSS structure modifications
- Automatic picture transmission (APT) transmitter (VTX1/VTX2) frequency change

All changes adequately verified – Low Risk

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Major Software Changes

- Added logic to enable thruster relays before firing
- Changed rate reasonableness error check from 2 to 10 Hz
- Added MIMU data rate check with autonomous commanding
- Disabled MIMU reasonableness test after MIMU switch
- Inhibited thruster firing after solar array panel deployment
- Changed switch line axis processing order to +/-X, +/-Y, +/-Z
- Separation time changed to 3940 sec after liftoff
- Check hardware liftoff bit instead of liftoff flag
- Clear orbit rate filter parameters during transition mode
- MIMU data ready wait time changed from 50 to 15 msec
- MIMU noise parameter changed from 15 to 50 microrad
- Check 2 Hz bit after DFS call in case both MIMUs are off
- Safe State turns off any MIMU that has a pressure failure
- Safe State turns off MHS at 241s to allow for MHS Safe Mode

Software Independent Verification and Validation

- IV&V performed by GSFC contracted team lead by Rochelle Abrams
- Ensures the software meets the requirements and needs of the spacecraft and its subsystems
- Tests all new or modified features under normal and anomalous conditions
  - Over 100 regression tests per FSW release
- Independently verifies all mission specific data
- Involved in Software Development Verification Facility (SDVF) discussions and S/C design reviews
- Team has extensive knowledge of current and heritage TIROS spacecraft and POES operational procedures

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GRD-2 AGC Anomaly

- GRD-2 exhibited low AGC during E-E test, with GRD-1 at nominal AGC level
  - Three unsuccessful attempts to relock to nominal AGC
- Condition induced after S/C power off by applying modulation to carrier prior to verifying nominal AGC
- Repeated low level AGC during troubleshooting, but could not replicate inability to lock at nominal AGC
  - Other testing could not exonerate GRD-2
- GRD-2 was removed and replaced with fully tested spare while panel 1 was opened
- Unit returned and tested good at vendor
- Unverified failure—Probable cause is locking on Command Generator sideband
- Risk low; impact is loss of redundancy

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STX-1 Temperature Anomaly

- STX-1 temperature above yellow limit during pre-ship SEPET testing
  - Consistently higher than STX-3 temps under similar operating and cooling conditions
  - Tests showed it is not a ground cooling system problem
- RF power output constant with increase in temp
- Panel 1 opened and STX-1 removed and replaced with spare unit
- Failure investigation found faulty thermistor circuit
  - Thermistor tested good when removed

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Sun Sensor Extender Cable

- Filter extension cable for SSE not installed on NOAA-N
  - Discovered during harness certification process
- Cable required to prevent SSA toggling due to noise
  - Extender cable with filter capacitors fabricated and installed at input to SSE
  - Design change effective for NOAA-L, M, N and N-P
- Test data review found that noise problem did not occur during NOAA-N spacecraft nominal test program
- Special noise test showed bit flips on output from coarse cells without cable and no bit flips with cable installed
- Cable installed for flight during STX-1 and GRD-2 change out
  - No “coarse bit flips” observed during retest

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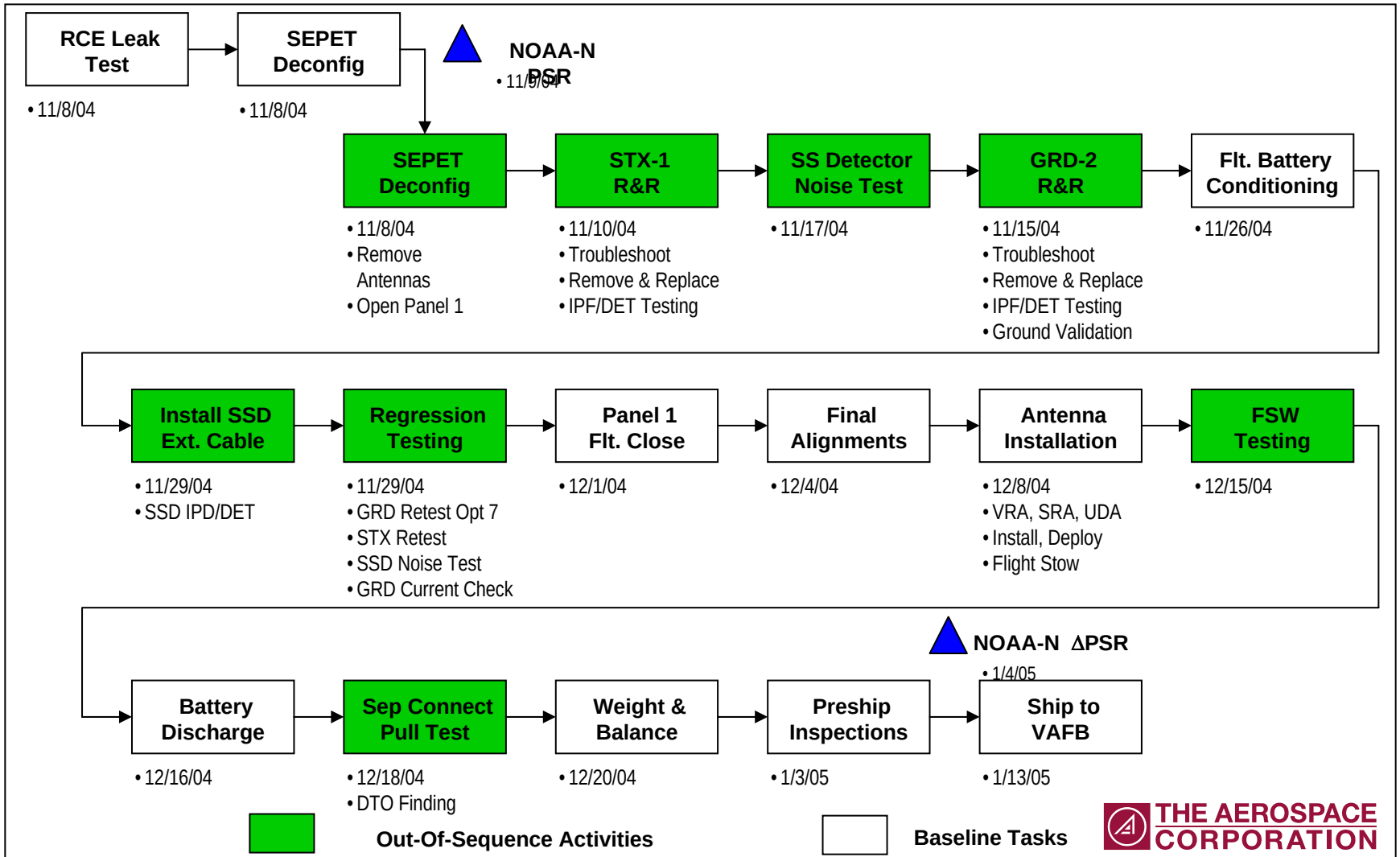
NOAA-N I&T Flow Since PSR



NOAA 17 STX-1 On-Orbit Anomaly

- STX-1 transmitter peak power abruptly dropped by almost 3 watts during 2/14/05 Fairbanks pass
  - Remained level at ~6 watts during remainder of pass
  - Xmtr temp rose ~4 deg C during this pass
- Power remains at ~6 watts in subsequent passes
  - Margin adequate for playbacks; no data lost
  - Peak temperature varies from 18 to 22 deg C
- TOAR has been opened for anomaly investigation
- NOAA 17 transmitters flown with known TRAK oscillator and transistor deficiencies
  - IIRT assessed medium-high risk of transmitter anomaly
  - Had STX-3 on-orbit anomaly on 4/28/03 with larger power drop
- Mods made to NOAA N transmitters to correct deficiencies

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Outline

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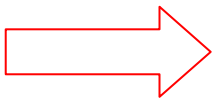

NOAA N Residual Risks

Probability	Impact						
		1	2	3	4	5	
	5						High
	4						Medium-High
	3						Medium
	2		GRD STX-3 RLG MHS	AMSU			Low-Medium
	1				TLYF		Low
		None	Loss of Redundancy	Loss of Some Data	Significantly Degraded Mission	Loss of Mission	

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NOAA N STX-3 Anomaly

- STX-3 transmitter frequency dropped 62 KHz below nominal during 2/2/05 SEPET testing at VAFB vs. +/- 30 KHz allowable
  - Measured several times and over a temperature range
- Transmitter frequency was nominal in Dec 04 factory SEPET
- Fault tree analysis and testing on engineering model identified crystal oscillator as most probable cause
- Postulated mechanisms for frequency shift
  - Increased mass due to particle adhering to crystal
  - Crack in crystal
- Faulty STX-3 removed from S/C at VAFB on 24 Feb and returned to factory for testing and oscillator removal
- Transmitter frequency shift verified in factory testing
  - Other transmitter performance parameters were nominal

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NOAA N STX-3 Anomaly-2

- Oscillator returned to TRAK for further testing prior to DPA
- TRAK testing of oscillator confirmed frequency shift and isolated cause to sealed crystal oscillator
- Hermetically sealed oscillator can was removed and sent to LM Denver for DPA
  - Frequency shift stable before and after can was opened
- DPA found several particles on crystal and partially-thru crack on bottom of crystal
- Crack determined to be root cause of frequency shift
  - Likely a latent defect induced during crystal fabrication or oscillator assembly
  - Defect could be present in crystals in other transmitters

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NOAA N STX-3 Anomaly
Rationale for Flight

- Replacement STX-3 transmitter subjected to confidence testing at factory and pedigree review of records
  - Frequency and other parameters verified to be nominal
- Installation/regression testing of NOAA N successfully completed at VAFB
  - Transmitter frequency and performance is nominal
- No prior history of large frequency shift in any TIROS or DMSP transmitter (~100 units) on ground or in orbit

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NOAA N STX-3 Anomaly
Rationale for Flight-2

- No prior TRAK oscillator rejects or returns for out of spec frequency shift other than normal aging
  - More than 30,000 oscillators delivered in last 10 yrs
- Probability of frequency shift in replacement STX-3 and other NOAA N transmitters is low
  - All are operating nominally
- NOAA ground stations can tolerate more than 250 KHz frequency shift from center
- High level of transmitter redundancy
  - Two of four needed for all primary mission data

Consequence 2; Likelihood 2

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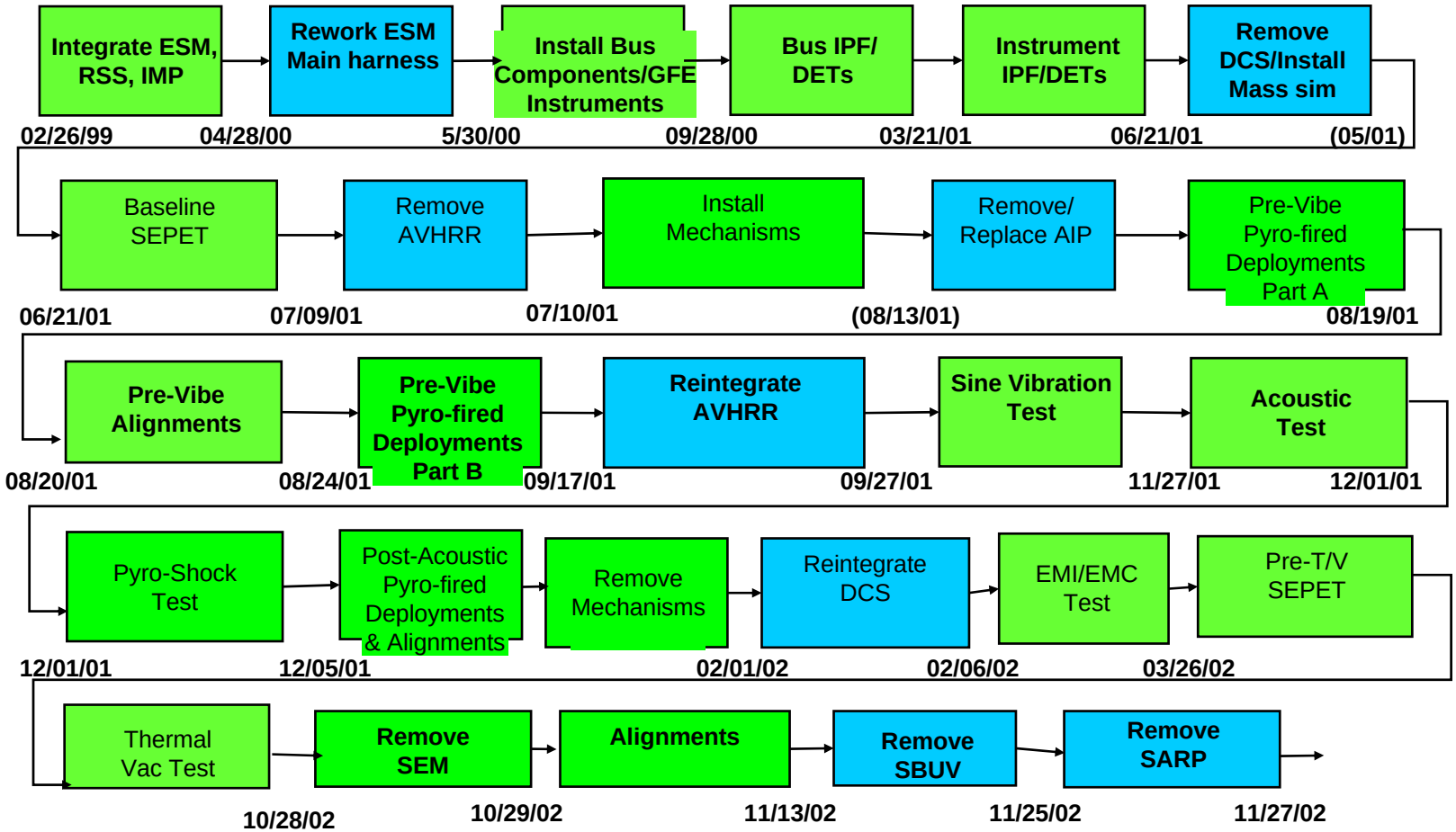
NOAA-N Assembly and Test Timeline



Legend: Green – Baseline flow, Blue – Out of Position/Out of Sequence

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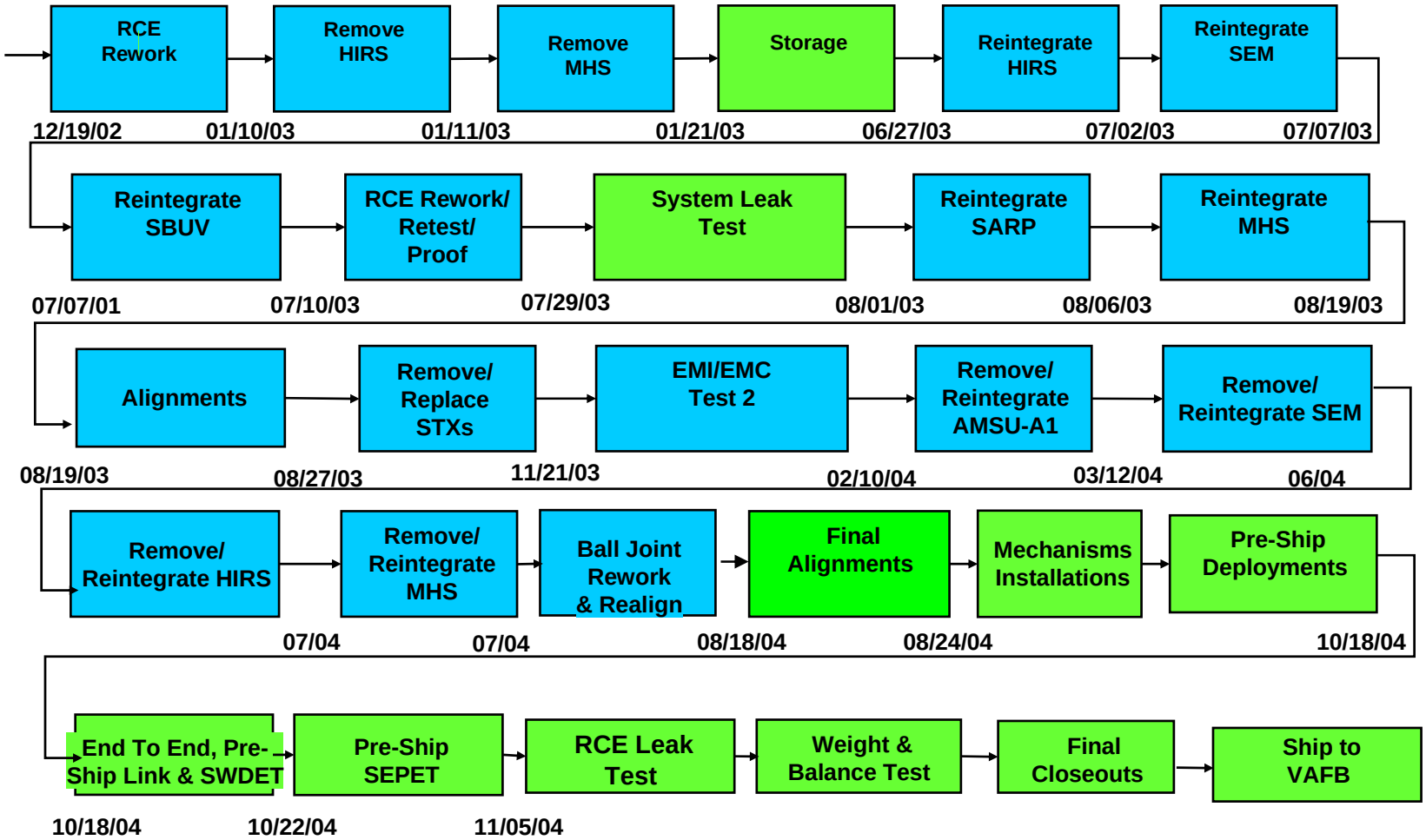
NOAA-N Test Timeline



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NOAA M and N R&R Comparison

NOAA-M R&R Following TVAC

- SEM – **Calibration**
- SBUV – **Repair Calibration Lamp**
- HIRS – **Repair damage from TVAC target drop**
- AVHRR – **Re-registration, IR endpoint, EMI tape**
- Yaw & Roll RWA
- Yaw, Pitch, Roll & Skew RWA
- STX 1-4
- SATCU
- Yaw & Roll RWA
- SBUV – **Calibration**
- DTR – **Rework—Potential overstress**
- Internal Coax Cable*
- AIP Buffer Box
- PSE Fuse Board*

NOAA-N R&R Following TVAC

- SEM – **Calibration**
- SBUV – **Calibration**
- SARP– **Rework USO circuitry**
- RCE Rework– **Leaking Thruster**
- HIRS – **Alignment Shimming**
- MHS – **EMI Rework**
- STXs – **Replace TRAK osc.& Q4**
- AMSU-A1– **Position Sensor rework**
- SEM – **Calibration**
- MHS – **Channel 2 Repair**
- Ball Joint Replacement
- STX-1*– **Temperature Anomaly**
- GRD-2* – **Low AGC Anomaly**
- SSD Extender Cable Install*

**** Required removal of Antennas & Open Panel 1***

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Test-As You Fly/System Test

- Several components and many instruments removed after S/C environmental testing
  - Number comparable to NOAA M
- Risk of installation problem, workmanship or other defect not being detected
- S/C was designed and program planned for instrument re-calibration and for removal of some deployables prior to storage and shipment
- Reasons for removals and thoroughness of retests were reviewed at PSR and delta-PSR

Consequence 4; Likelihood 1

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AMSU-A1 DC Converter Grounding Issue

- Potential of level shift in data due to common mode noise from intermittent grounding connection in DC-DC converter
  - Observed in S/N 107 during high temp ground testing
  - Believed to be systemic problem of degraded common mode filtering due to poor chassis ground connections
- Less than desired grounding found in other units, but no significant channel level shifts
- S/N 107 signature different from EOS AQUA AMSU A chan. 7 noise and NOAA-N unit (S/N 109) chan. 8 turn-on jump
- NOAA-N use-as-is rationale accepted by NASA/NOAA based on:
  - No anomalies to date, lower operating temp. extremes, and ability to correct science data on the ground (if the shift is regular and no worse than on S/N 107)

Consequence 3; Likelihood 2

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RLG Laser Intensity Concern

- Failures of same Honeywell RLG on other systems due to low laser intensity
  - Concern over ability to meet mission life requirement
  - Loss of RLG means loss of MIMU
- Some uncertainty in root cause, influencing parameters and flight vs. ground bias
  - HI believes most likely cause is darkening of mirrors
- Wide variation in projected life based on small sample size and large extrapolation of early laser intensity data
- HI and LM believe NOAA N RLGs will meet mission life based on gyro screening criteria and 8 torr pressure
  - High initial LIM and low slope of LIM vs. lasing time
  - 55% Q-test LIM de-rating
  - 0.73 micro amp failure threshold at 2X mission life + 1000 hrs
- S/N 74 Z Gyro does not meet 55% de-rating criteria
- Mission risk reduced by MIMU redundancy and off time

Consequence 2; Likelihood 2

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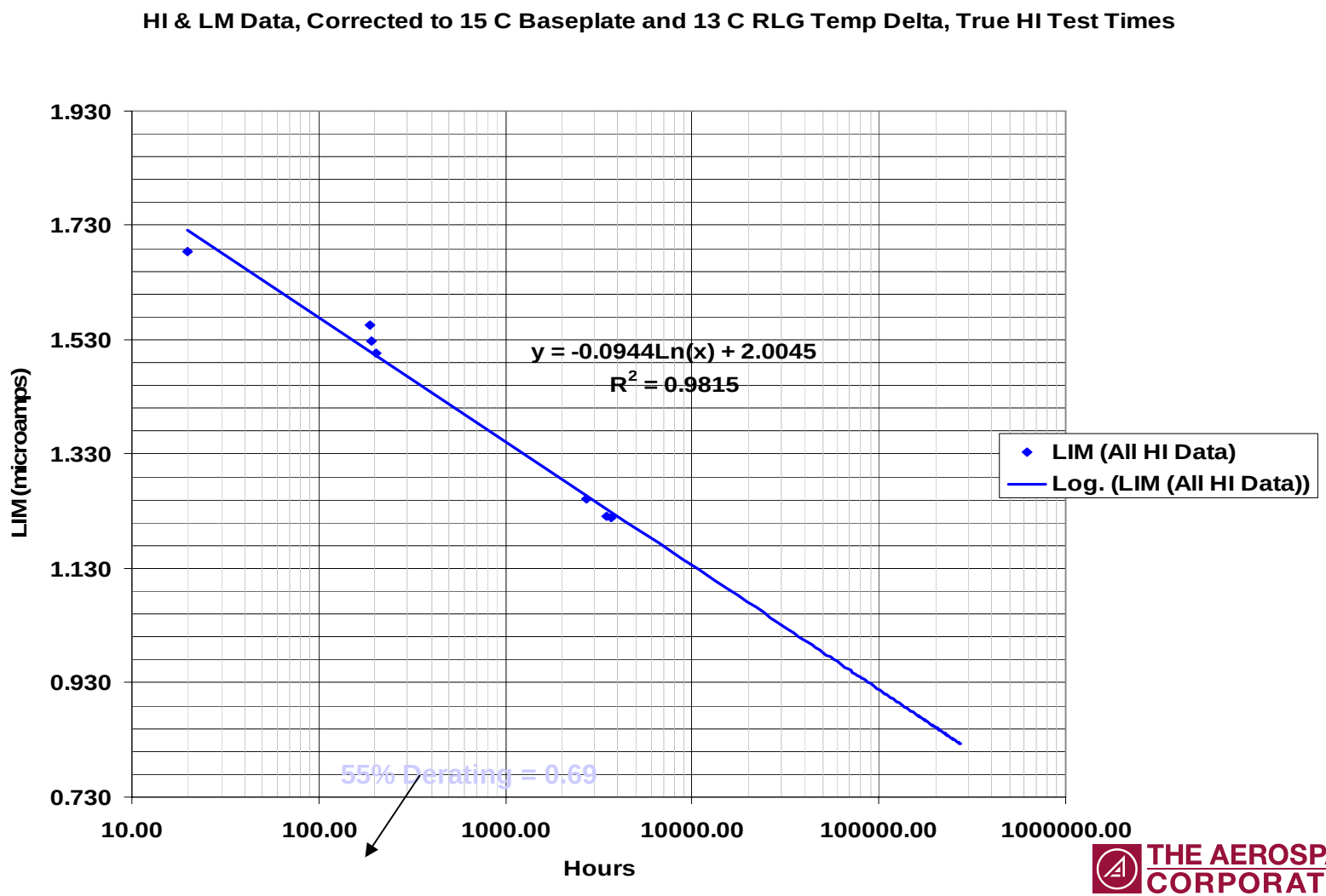
TIROS SN 74 Z Gyro Life Projection



MHS First Flight Risk

- Reworked several times for EMI issues after S/C TVAC test
  - No evidence of problem in subsequent tests
- Several data flow problems in early testing on S/C
  - Resolved by software changes
- Some question on MHS thermal environment and margins
  - Eumetsat satisfied thermal requirements being met
- Limited visibility into instrument repair and fleet quality
- Low-medium probability of MHS performance or ops problem

Consequence 2; Likelihood 2

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HIRS MOTOR LIFE

- The HIRS filter wheel motor on NOAA-K failed prior to achieving life goal (3 years).
- The HIRS filter wheel motor on NOAA-L achieved goal life but failed after less than four years.
- For NOAA N
  - The “N” motor appears to have better torque margin than either “K” or “L”.

Consequence 4; Likelihood 1

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NOAA-N Management Processes Assessment

- The 10 Point Key Project Management Practices (KPMP) were not in use as a tool at the time the PER and earlier reviews.
  - 13 point process specific review done by Red Team for NOAA L
- KPMP assessment intended to be used from beginning of project lifecycle so that corrective action can be implemented and deficiencies overcome along the way, thereby stimulating good practice to become the norm.
- The IIRT has evaluated the mission success related risk associated with the KPMP evaluation at the PSR and has factored this into the residual risk assessment.

No additional corrective action required

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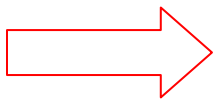
Outline

- Background
- Review Observations/Findings
- Areas of Risk
- Summary and Recommendations



NOAA-N IIRT Summary

- NOAA-N S/C state of readiness was assessed via S/C Pre-Environmental and Pre-Ship Reviews
- Mini block change from NOAA K, L and M
  - Heritage primary instruments and many S/C components
- First flight items have been adequately verified and are judged to be low risk
- All anomalies and unverified failures were thoroughly reviewed
  - None are mission critical
- Adequate spacecraft regression testing was performed after STX-1, GRD, SSA cable and STX-3 were replaced
- All required factory testing was successfully completed
- Process improvements after N' mishap enhance probability of mission success

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NOAA-N IIRT Summary (Continued)

- Low added mission risk due to component and instrument removals after TVAC
  - Comparable to NOAA M
  - Retest has been thorough
- AMSU generic grounding concern is low-medium risk of some data loss
  - No evidence of similar problem on NOAA-N or N'
- RLGs in MIMUs have been assessed against low LIM life criteria
  - High probability of adequate life for S/C 2 yr requirement
- Low-medium risk of MHS data flow or ops problem on 1st flight
  - Low risk to S/C and other instruments
- Low risk of repeat of STX-3 frequency drop

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NOAA-N IIRT Conclusions

- NOAA N on-orbit performance and operational life are expected to be comparable to NOAA M
- Mission risk is judged to be comparable to NOAA M due to
  - Large number of changes/first time items
  - New launch vehicle and ascent profile
- Overall risk judged to be green category
- Need to close all open launch liens.

Recommend continuing processing for launch

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IIRT Recommendations for NOAA N-Prime

- Provide increased heat rejection capability for battery 2A to reduce it's on-orbit temperature
- Perform a worst case cold harness resistive force measurement to obtain data to anchor torque margin calculations
- Insure all RLG's have adequate margin vs. LIM screening criteria

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STX-3 Anomaly Investigation
Backup Charts

- Crystal Oscillator Package
- Cracked in Crystal
- Particles on Crystal

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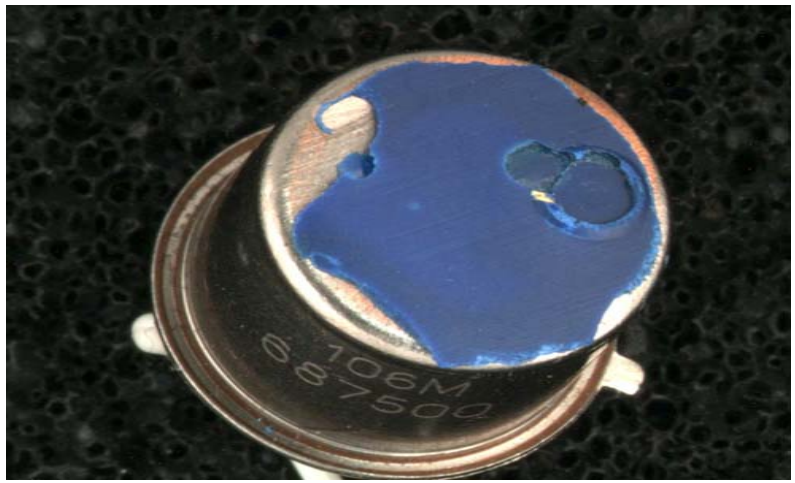
Crystal Oscillator Package



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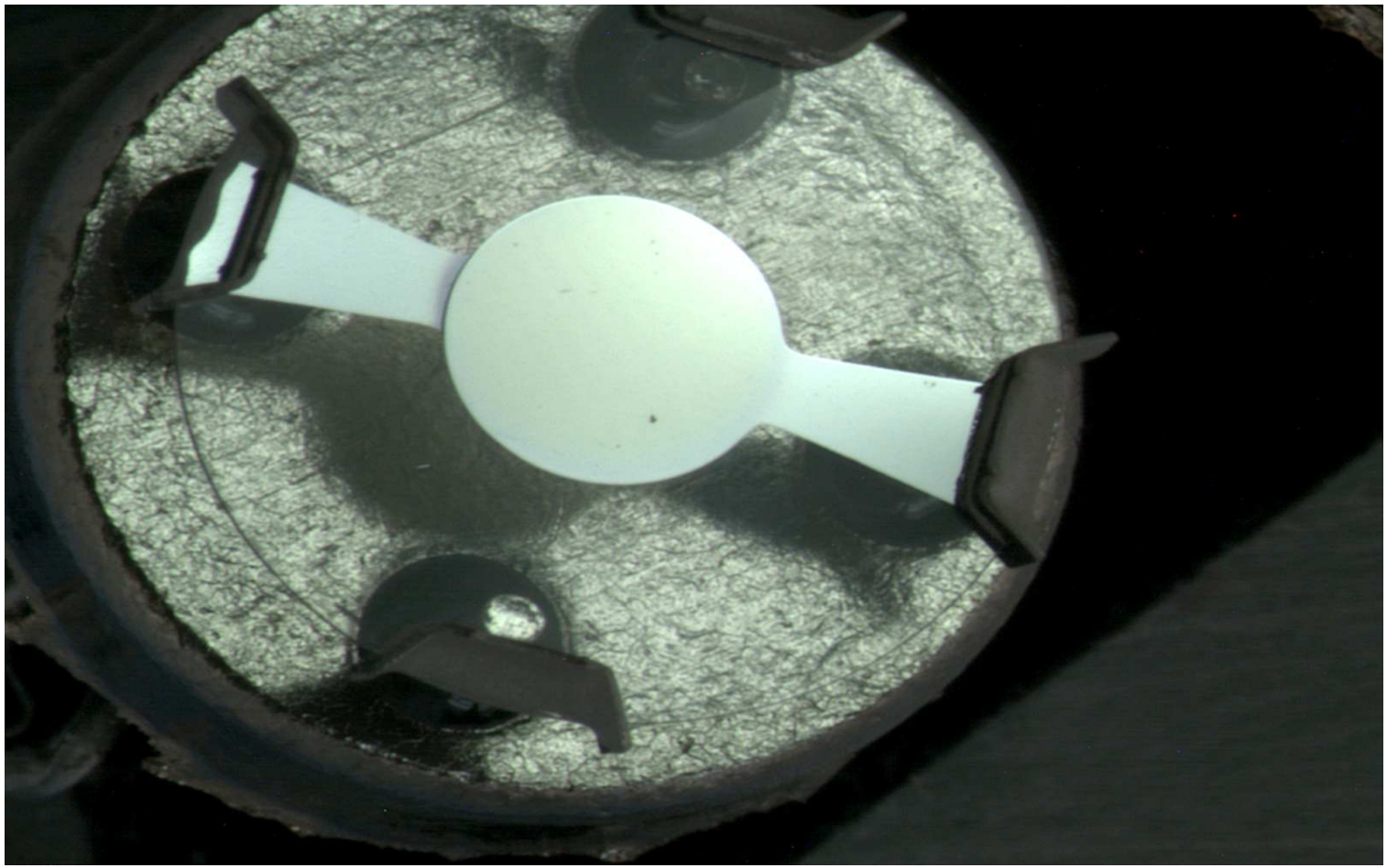
Internal Visual Examination



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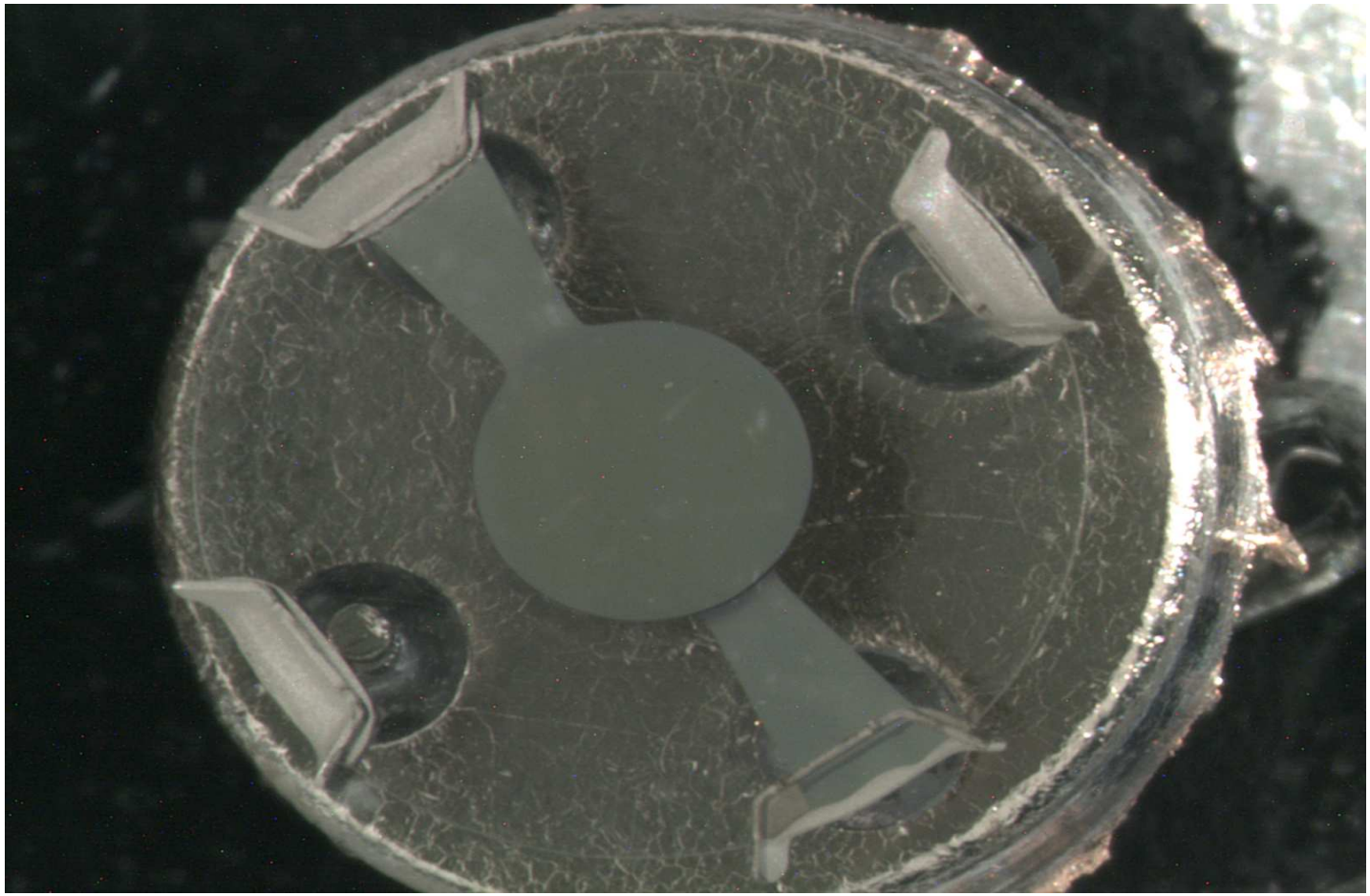
Crystal Oscillator Close-up



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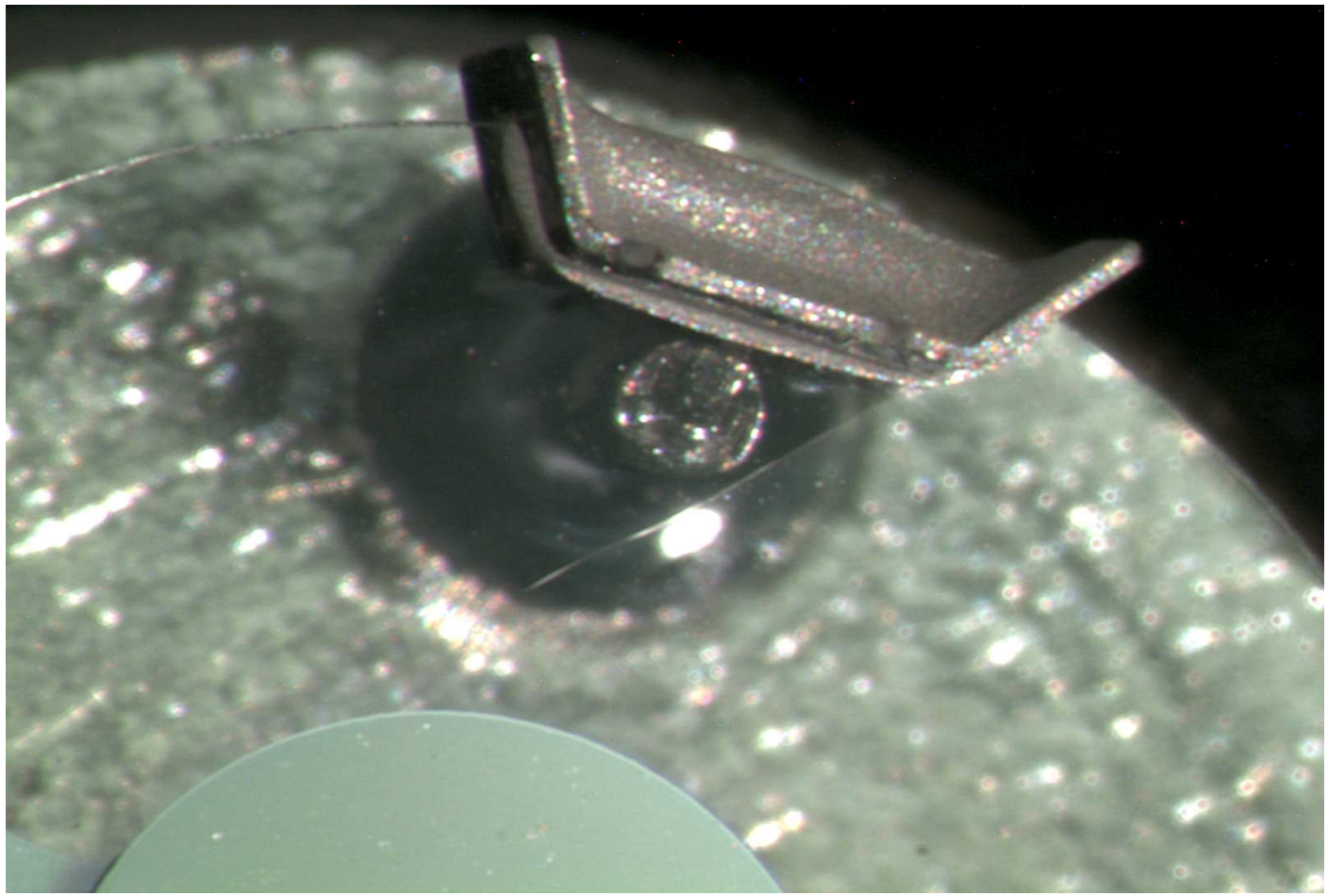
Crack in Crystal- Visual Exam



Crack emanating from electrode

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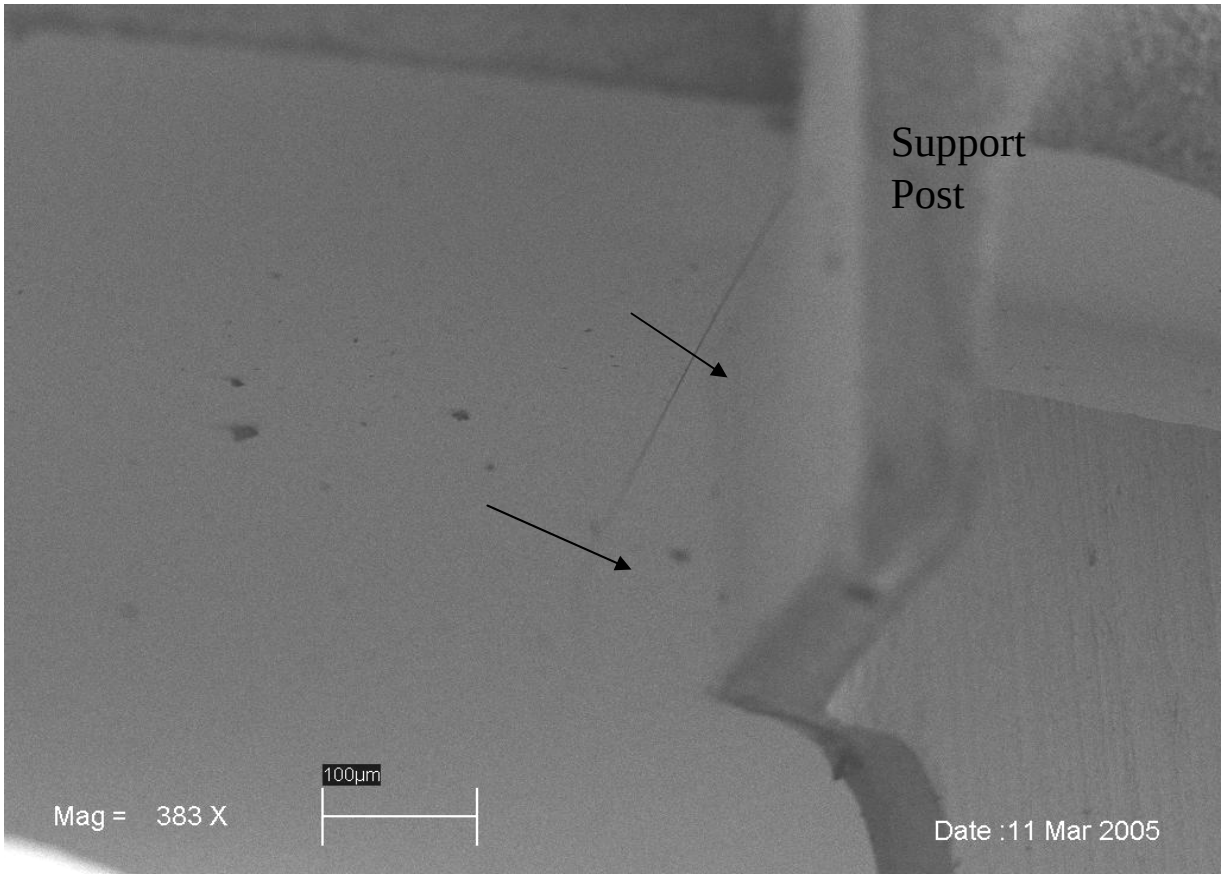
Secondary Electron Image of Crack



Crack on bottom surface starting under outside edge of support post.

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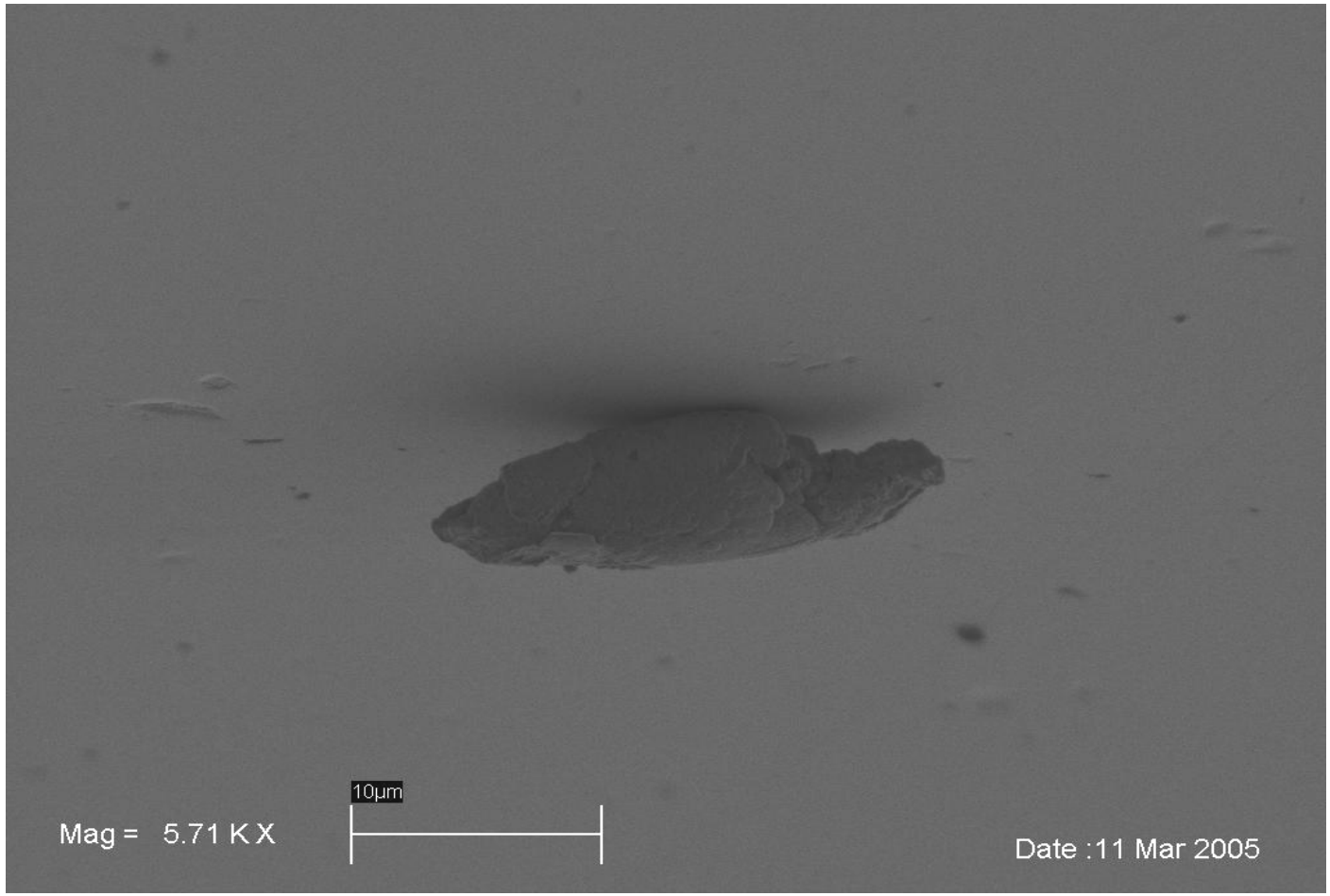
Particle 1 on Bottom Surface of Electrode



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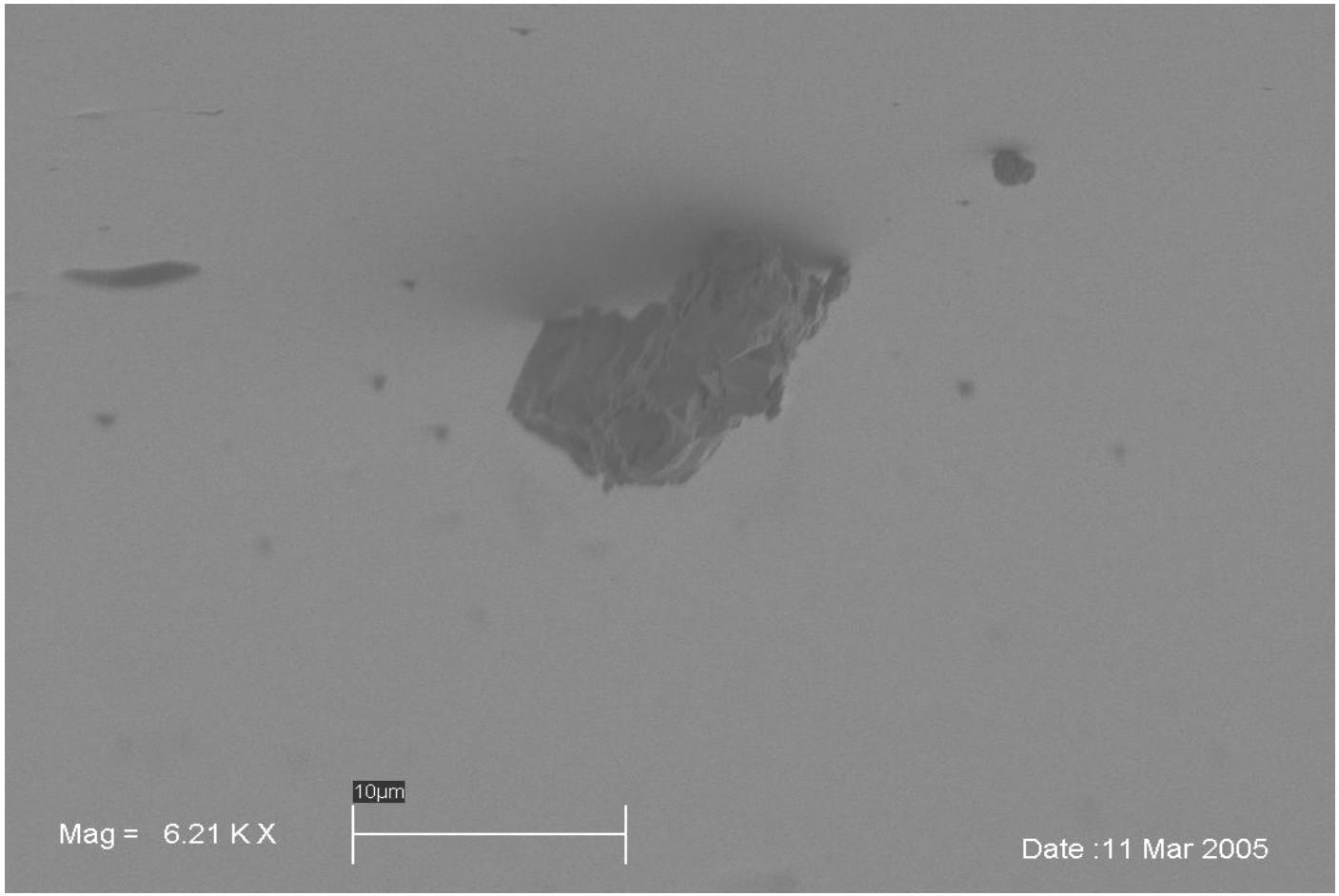
Particle 2 on Bottom Surface of Electrode



THE AEROSPACE CORPORATION

LAUNCH VEHICLE

D. Breedlove
KSC

NOAA-N MRR

Launch Vehicle

Dave Breedlove
KSC/Mission Integration Manager
3/31/2005

Agenda

- Launch vehicle Overview/Status
- Launch Site Status
- Launch Management
- Summary

NOAA-N Launch Vehicle

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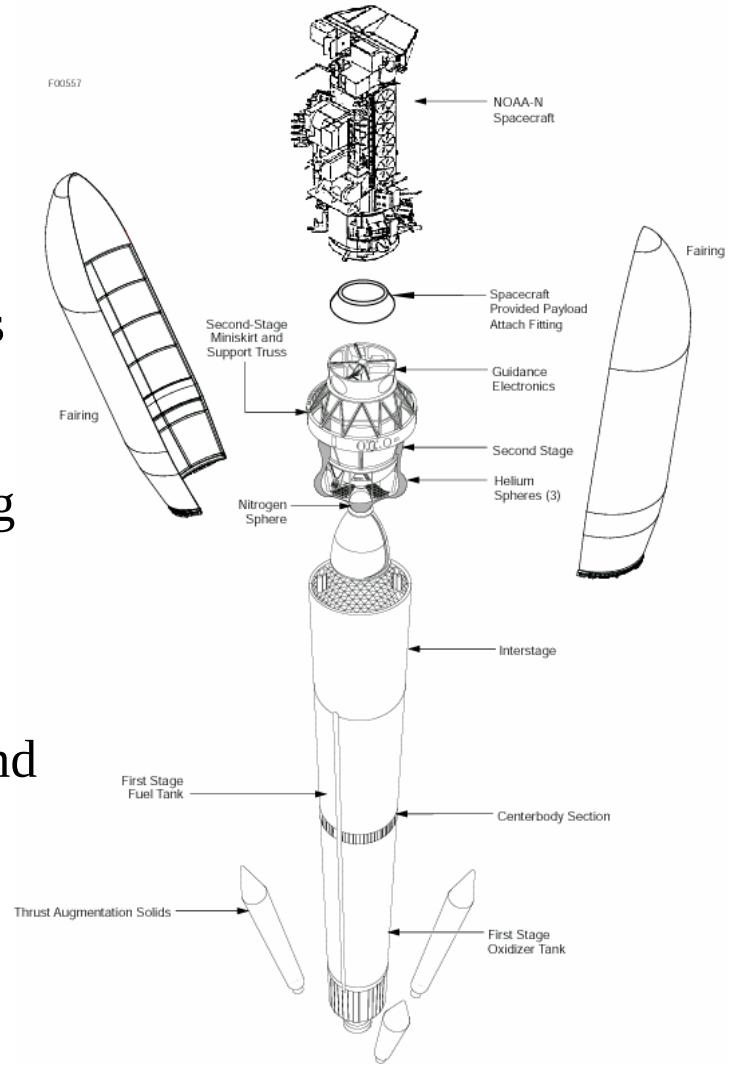
- Vehicle configuration: 7320-10
- Launch site: SLC-2 at VAFB
- Initial launch capability: 11 May 2005
- Mission requirements:
  - Circular orbit with a sun-synchronous inclination
- 10 ft dia. Composite Payload Fairing
- Spacecraft supplied Payload Attach fitting
- Two (2) mission specific access doors
  - Pyro/thruster enable, fill&drain
  - Purge access
- Special cleaning of PLF (VC3) and Second Stage (VC3)
- Fairing mounted re-radiating system.



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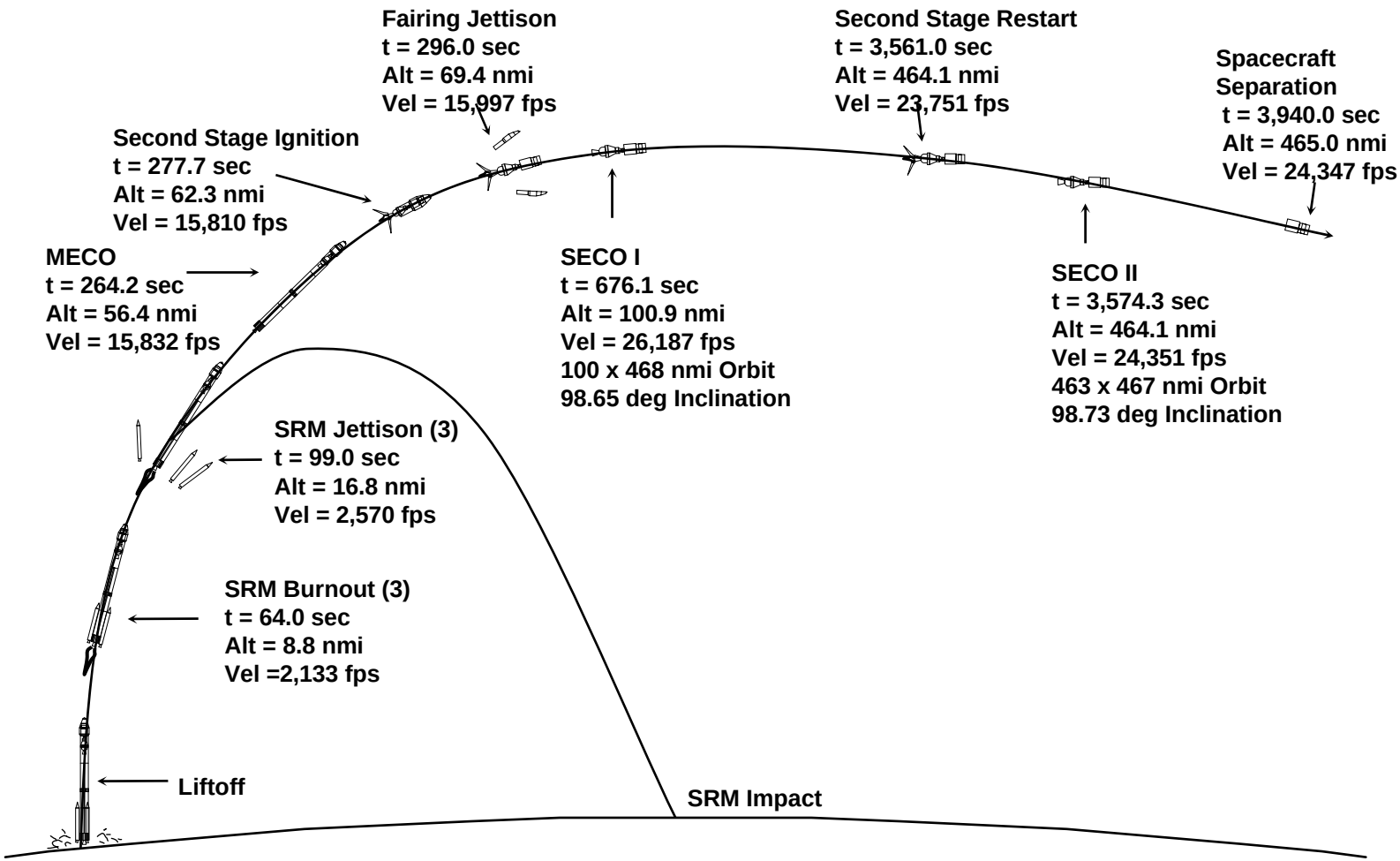
NOAA-N Flight Profile



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Mission Requirements

- Orbit Requirements (defined immediately after spacecraft separation)
  - Semi-Major Axis (km/nmi) 7237.89/3908.15
  - Eccentricity 0.0000
    - Circular Orbit Altitude (km/nmi) 859.7/464.2
  - Inclination (deg) 98.7300
- Launch window: 10:22:01 - 10:32:01 UTC (03:22:01 - 03:32:01 PDT)
  - 11- 14 May, 19-23 May, and 28-31 May are “good launch days”
  - Customer requested Mission Assurance COLA
- Second Stage Probability of Command Shutdown (PCS) $\geq$99.7%
- Free Molecular Heating Rate at Fairing Separation <0.0894 BTU/ft2-sec
- Thermal conditioning roll at 1 deg/sec
- GN2 purge cooling system
  - Requirement to keep spacecraft transmitter cool during operations at launch site
    - A Passive system utilizing existing Payload Fairing A/C is the primary means to meet the requirement, currently working some technical issues that will be resolved prior to S/C mate
    - The GCS (Gaseous nitrogen Cooling System) is available as a back-up pending resolution of some operational issues prior to S/C mate

Vehicle Performance

Item	DTO
Spacecraft Weight Including PAF (lb)	3180
Second Stage Velocity Reserve (fps)	1258
Second Stage Velocity Reserve Required for 99.7% PCS (fps)	373
Second Stage Performance Model Update Since DTO (fps)	35
"Tag" Vehicle Performance Allowance (50 fps), Western Range Launch Winds (40 fps) Early Booster Fuel Loading (40 fps)	130
Velocity Reserve Margin (fps)	720

Special Attention Items

- First Flight Item
  - Requirement for a Re-Radiating system capable of uplink and downlink of spacecraft data with the PLF on
    - Design utilizes internal pickup antennas mounted 12 inches nominal from the SC antennas by way of PLF mounted brackets
    - Signal is picked up and routed using coaxial cable to antennas mounted on PLF exterior
    - Hardware is qualified for this application per ERB-02-244
    - SLC-2 to B836 link test successfully demonstrated ground link performance
    - Additional link test to be performed prior to launch
- Re-Rad system will meet NOAA-N requirement

Special Attention Items (continued)

GEM-40 Nozzle Delaminations

- Throat Support Insulator (TSI) ply separations exist on all three NOAA-N GEM-40 motor nozzles
  - Separations meet the NASA acceptance criteria
  - Next inspection is prior to NOAA-N spacecraft mate to the Delta II
- The NOAA-N GEM-40s are acceptable for flight

Spacecraft 137 MHz beacon transmitting inside payload fairing

- Analysis shows a 1 watt source at 137 MHz is capable of producing an average field strength above ICD level of 10V/m at that frequency with fairing on
  - Levels are potentially damaging to some sensitive avionics
  - No issue fairing off
- S/C implementing hardware and software fix to verify beacon will not transmit after fairing installed

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Current Status

Engineering Review Boards

ERB #	TITLE	DESCRIPTION	RATIONALE	STATUS
02-244	NOAA N Re Radiation Design on Payload Fairing	The NOAA N Spacecraft requires re radiating system for on-pad command and telemetry. The re radiating system will be a first-flight and mission unique item on a Delta II Launch Vehicle.	ERB held 7/1/03. ERB re convene held 8/7/03. The re radiating system hardware is qualified for this application and will meet NOAA N requirements.	OPEN Paper Clean-up ECD 3/24/05
03-123	Out-Sourcing of Delta II Fuel Transfer Tube Tunnel Support Isolators	Qualification and first production of the LOX Tunnel/Fuel transfer tube isolator blocks from a new supplier (Danner Corp).	Boeing ERB held 2/20/03. Qualification test plan was approved and has been implemented. Post qualification test review held 6/9/03. NASA Engineering strength review and assessment is active.	OPEN ERB scheduled for 4/5/05 ECD 4/12/05

Current Status (continued)

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ERB #	TITLE	DESCRIPTION	RATIONALE	STATUS
03-289	NOAA-N Mission Specification Review	ERB held to review the NOAA-N Mission Specification.	ERB held on 1/6/04 reviewed mission technical requirements and implementation. 1 action item being reviewed by LSP Chief Engineer.	OPEN Paper Clean-up ECD 3/31/05
04-479	RIFCA S/N 20093 Alignment Observation	During Cape bench test of RIFCA S/N 20093 on 10/12/04, alignment failed to converge within required 5 minutes of command. Failure isolated to shorted photodiode in one of the six gyros. Short was due to silver migration (dendrite growth) across the anode glass seal of the photodiode.	ERB held 10/29/04 accepted RIFCA S/N 20070 (NOAA-N) for flight based on very low probability of occurrence and the ability to verify proper operation of the gyros during all testing and until the moment of lift-off. In addition, the failure mode is to trigger redundancy. Time separation from cluster of other similar photodiode failures, and extended operating time on the unit, provides separation against a yet unknown root cause.	CLOSED for NOAA Fleet open item

Current Status (continued)

John F. Kennedy Space Center

ERB #	TITLE	DESCRIPTION	RATIONALE	STATUS
02-337	NOAA N GN2 Purge Requirement	The NOAA N transmitter reaches temperatures during pre-flight testing that could degrade transmitter performance or cause failure and requires an externally-generated cooling source.	ERB held 8/5/04 and 8/10/04. A purge fitting allows for application of clean GN2 at a prescribed temperature and flow rate. Two approaches are possible; vortex cooling and a process cooler. The vortex device is passive. The process cooler incorporates temperature sensing and feedback to control the GN2 delivery temperature. 3 action items remain in work.	OPEN Paper Clean-up ECD 3/31/05
04-542	NOAA N Spacecraft Purge – Passive Cooling Option	NOAA N requires a cool GN2 purge for transmitter cooling. This is an alternative to the GCS apparatus described in ERS 02-337 and approved as GSE in ERS 04-321.	ERBs held 12/22/04 and 1/26/05. The passive cooling system routes an uninsulated GN2 flexhose inside the payload fairing A/C duct. The passive cooling option will serve as the primary cooling system. 1 action item being reviewed by LSP Chief Engineer.	OPEN Paper Clean-up ECD 4/5/05

Current Status (continued)

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ERB #	TITLE	DESCRIPTION	RATIONALE	STATUS
04-521	NOAA-N GN2 Gaseous Cooling System (GCS) DCR	NOAA-N requires cooling to be provided via the GN2 purge port to maintain acceptable temperature limits of the STX4 transmitter.	ERB held 12/6/04. A GN2 cooler will be provided by KSC to meet this mission unique requirement. KSC/YA performed the modifications and acceptance testing. This GCS will serve as the back-up cooling method. 3 action items remain in-work.	OPEN Paper Clean-up ECD 4/5/05
04-552	RS-27A -13 System LOX Flexhose with 7-Braid Wire Carrier	RS-27A engine S/N 2135 (-13 system) was found with a LOX High Pressure Duct (HPD) flexhose with 7 braid wire carriers instead of the nominal 8. There are 4 layers of wire. The Fuel HPD flexhose has 7 braid wire carriers with 4 layers.	ERB held 1/5/05. NOAA-N has LOX flexhoses from Lot 4 and are accepted for flight. ERB re-convene held 2/23/05. NOAA-N has Fuel flexhoses from Lot 7 and are accepted for flight.	OPEN Paper Clean-up ECD 3/31/05

Current Status (continued)

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ERB #	TITLE	DESCRIPTION	RATIONALE	STATUS
05-36	Deep Impact 2nd Stage Propellant Usage	First burn of Deep Impact's 2nd stage showed anomalous mixture ratio resulting in a 2nd stage Propellant Utilization (PU) of –3.4 sigma with an oxidizer residual of 105 pounds.	ERB held 2/22/05. The ERB cleared any hardware anomaly on missions such as NOAA-N that have a long 1st burn of the 2nd Stage profile (exceeding 330 sec). NASA LSP Chief Engineer has therefore lifted the constraint against the NOAA-N spacecraft erection.	CLOSED for NOAA-N
05-38	Avionics Anomaly during System 1 Power Down Test	During lane down testing of RIFCA in Decatur, an intentional loss of power in Avionics System 1 resulted in discrete commands being commanded off for 20 msec and then back on.	Boeing recommends no software change because there is an extremely low probability of occurrence for Delta II and a low level of severity. Boeing risk is baseline to low. Initial NASA Engineering assessment concurs with this approach and will be formally brought to the NASA ERB.	OPEN ERB scheduled for 4/12/05 ECD 4/18/05

Current Status (continued)

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Engineering Review Items

ERS #	TITLE	DESCRIPTION	RATIONALE	STATUS
05 35	C Band Transponder Pre ATP Failure	C Band Transponder S/N 20050 that was assigned to NOAA N failed a Pre ATP vibration test at the supplier (Herley).	Root cause of the failure was determined to be loose FOD inside the IF amplifier hybrid. Three x-ray negatives showed one particle moving around to different locations as the C Band Transponder was moved. Estimated size of the FOD is approx 10 mils. C Band Transponder S/N 200087 has subsequently been assigned and installed in the NOAA N 2nd Stage.	OPEN ECD 3/29/05
04 47 1	10' Composite Fairing – Separation Stresses	Original separation stresses for the 10' composite payload fairing (PLF) were small and insignificant. A mistake was later found with computation of separation stresses.	The stresses were actually 2 to 3 times higher than originally computed. Although new stresses were much higher, Boeing Strength determined that stresses were still not an issue. NASA Engineering determined the composite PLF for Swift was acceptable for flight with the higher separation stresses after completion of inspection. NOAA N's PLF inspection was performed 1/25/05.	OPEN ECD 3/31/05

Current Status (continued)

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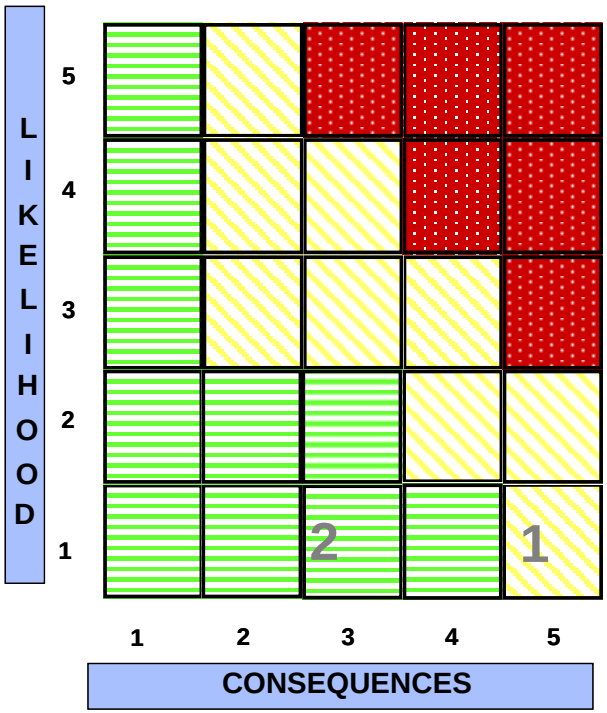
Engineering Review Items (continued)

ERS #	TITLE	DESCRIPTION	RATIONALE	STATUS
04 523	NOAA N Main Engine Yaw Slew Grinding Noise	In DMCO, a faint grinding noise at the 1st stage Main Engine yaw actuator was heard when slewing.	The noise does not violate SSTRD codes. Grinding noise was from the gimbal block bearing. Noise is similar to that heard on AURA pitch actuator which was accepted for flight. A pop sound was also heard. Believed to be from air in the system, but still acceptable. The fluid will be bled again at VAFB. NASA Engineering assessment will conclude after fluid bleed and on- pad slewing.	OPEN ECD 4/12/05
05 14	TFA Crack Assessment for NOAA N	This ERS assesses the 1st and 2nd Stage E Packages assigned to NOAA N. Assessment will identify probability of the presence of a TFA crack.	The detailed process of manually screening ATP raw data to detect these cracks is in work for the E Packages assigned to NOAA N. NASA Engineering assessment is active.	OPEN ECD 3/31/05

Current Status (continued)

Delta II Fleet Accepted/Open Risks



Item	Status	Risk ID	Risk Description
1	A	V00 15	9 Flight critical engine section components are unqualified for the newly revised P95/50 MEFL MECO transient environment. **Risk accepted by LSP 4/24/02** **(Ref ERB 01377KSC0 and ERB 02-23)**
2	A	V00 22	During acceptance test process (ATP), a loose chip capacitor was found in a first stage Power and Control Box DC-DC Converter hybrid circuit. **Risk accepted by LSP 9/26/03** **(Ref ERB 03-426)**

Schedule, Range & Launch Site Status

NOAA-N Launch Site Processing Schedule

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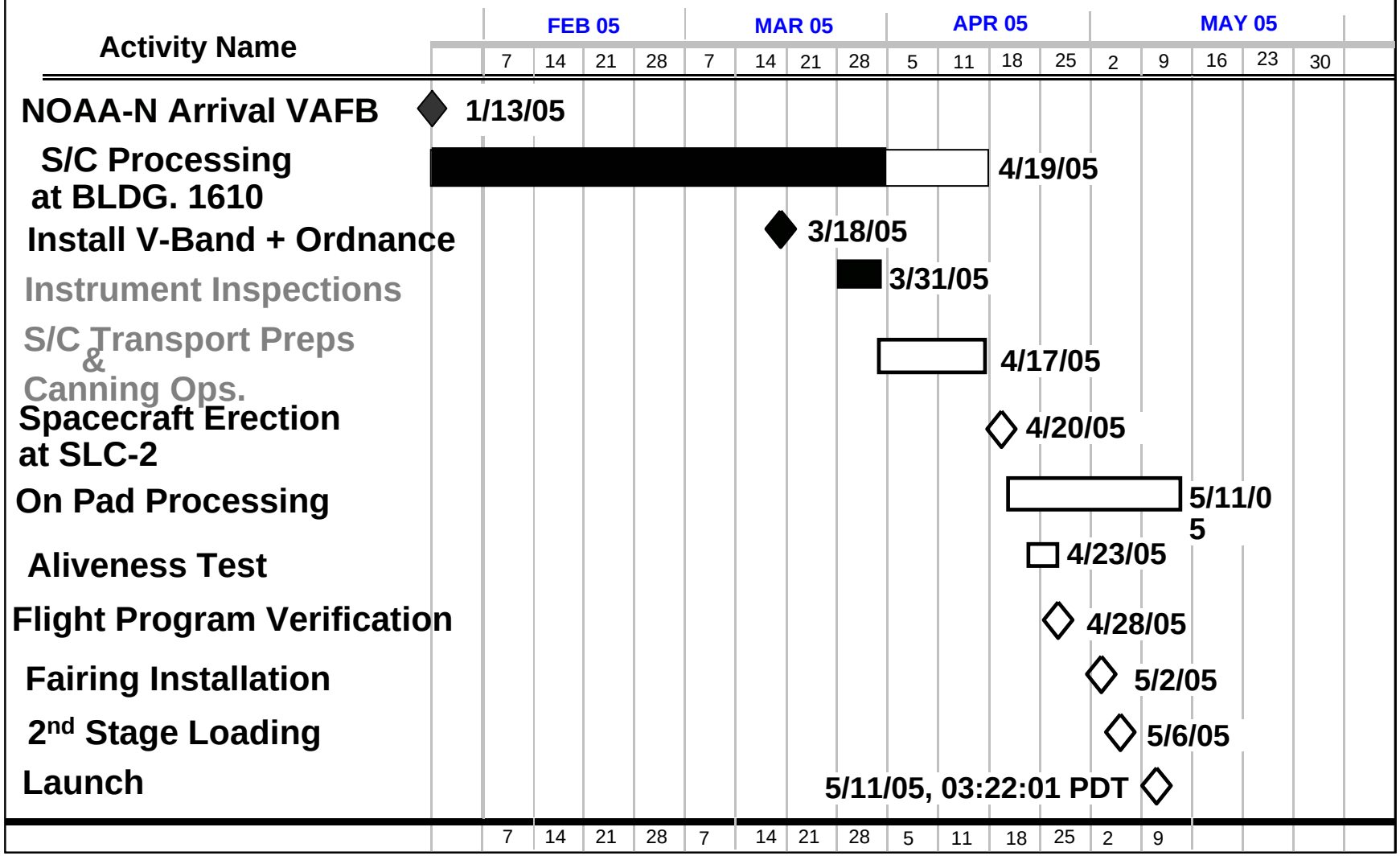

NOAA-N Documentation Status

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- Requirements Documentation Status
  - All requirements documentation in place to support NOAA-N processing (LSSP, CCIP, OR/OD)
- Safety Documentation Status
  - Accident Risk Assessment Report (ARAR) approved by 30th SW Range Safety received 10/12/04
  - Cesium-137 Authorization request approved by KSC Radiation Officer and Air Force 30 MDOS/SGOAB Bioenvironmental.
  - Hazardous and Non-Hazardous procedure review and approval complete

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NOAA-N Launch Site Facility Status

- Installation of the B836 trailer and support equipment to augment office space completed and fully operational

- Power outage at B1610
  - On 13 March, a VAFB power outage was experienced which dropped power to the entire B1610 facility.
  - the UPS system and the backup diesel generator did not come online as expected
  - Power to the facility restored within 45 minutes
    - All environmental parameters remained within specifications during the power off period.
  - No root cause was found in the Investigation of the failure of UPS system
    - Subsequent testing shows system is working as designed

NOAA-N Launch Site Facility Status

  - The s/c team agreed to continue testing with the known potential risk with existing UPS system
    - Additional Facility personnel will be standing by the UPS system for crane ops to enable UPS bypass if needed

- Launch Site Integration and B1610 processing activities are on track to support a 05/11/05 launch date.

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NOAA-N Communications and Telemetry

- NASA VAFB Support
  - Mission Directors Center
  - Launch Vehicle Data Centers
  - Telemetry Laboratory
  - NASA 28ft Tracking Antenna
  - Spacecraft and Launch Vehicle Data Circuits
  - Spacecraft ReRad system modification
    - 8 ft. Antenna refurbishment complete
- Validation
  - PPF Data, Voice, Video, and RF Circuits Validated
  - Pad circuits will be validated prior to S/C erection
  - All communications circuits will be re-verified prior to MDR and configuration will be maintained until after launch
  - Data circuits will be tested prior to MDR and again on the day of launch

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NOAA-N Communications and Telemetry

- NASA KSC Support (AE)
  - Launch Vehicle Data Centers
  - Telemetry Laboratory
  - Spacecraft and Launch Vehicle Data Circuits
    - Spacecraft data via MAL will be transported from AE to VAFB and SOCC for spacecraft separation
- Validation
  - Data circuits will be tested prior to MDR and again on the day of launch

Communications and Telemetry

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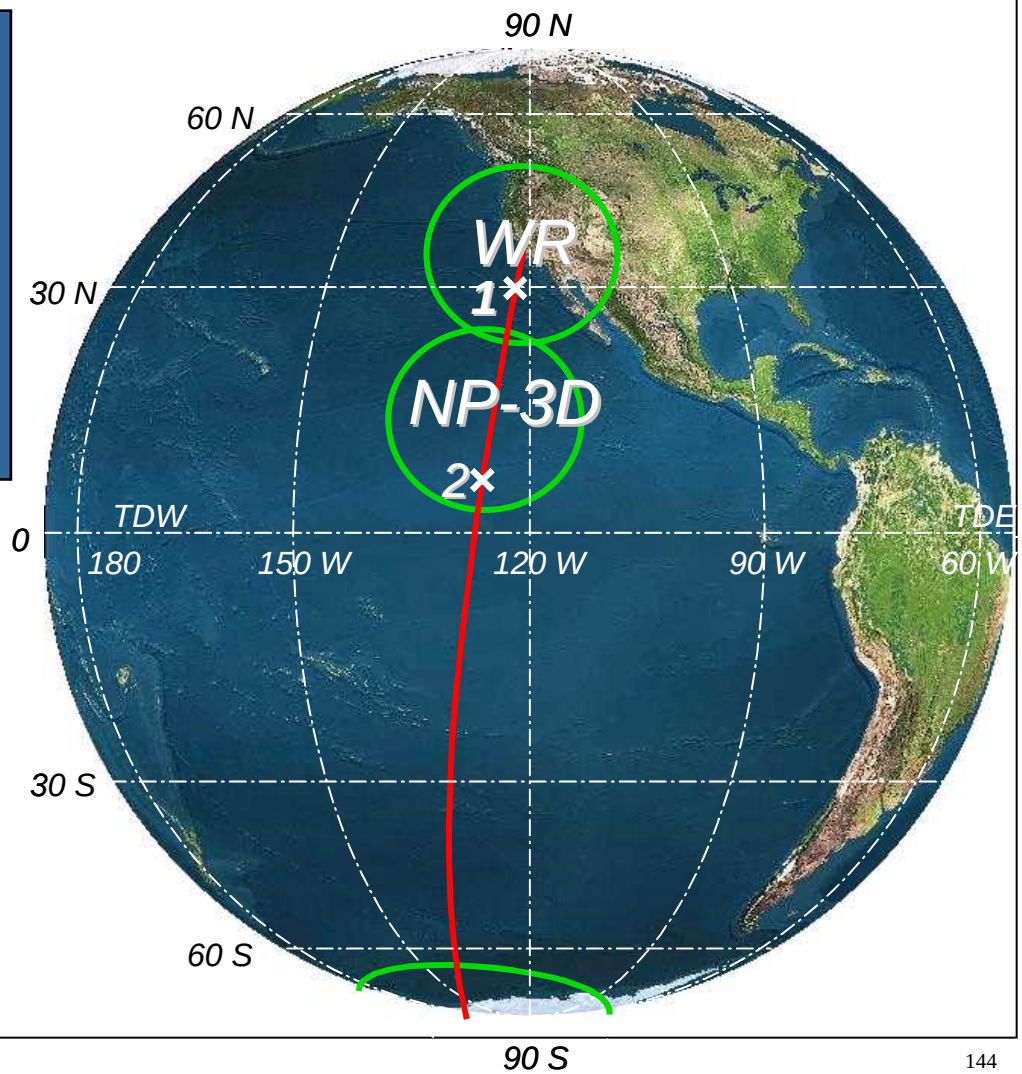
Legend (time, sec)
1 = Main Engine Cutoff (264.24)
2 = SECO-1 (676.1)

WR Tracking Sites
VTS -> AFSCN Vandenberg
TRS -> VAFB TM Receiving Station
SNI -> NAWC San Nicolas Island

NP-3D
P-3 -> Instrumented Aircraft



Communications and Telemetry

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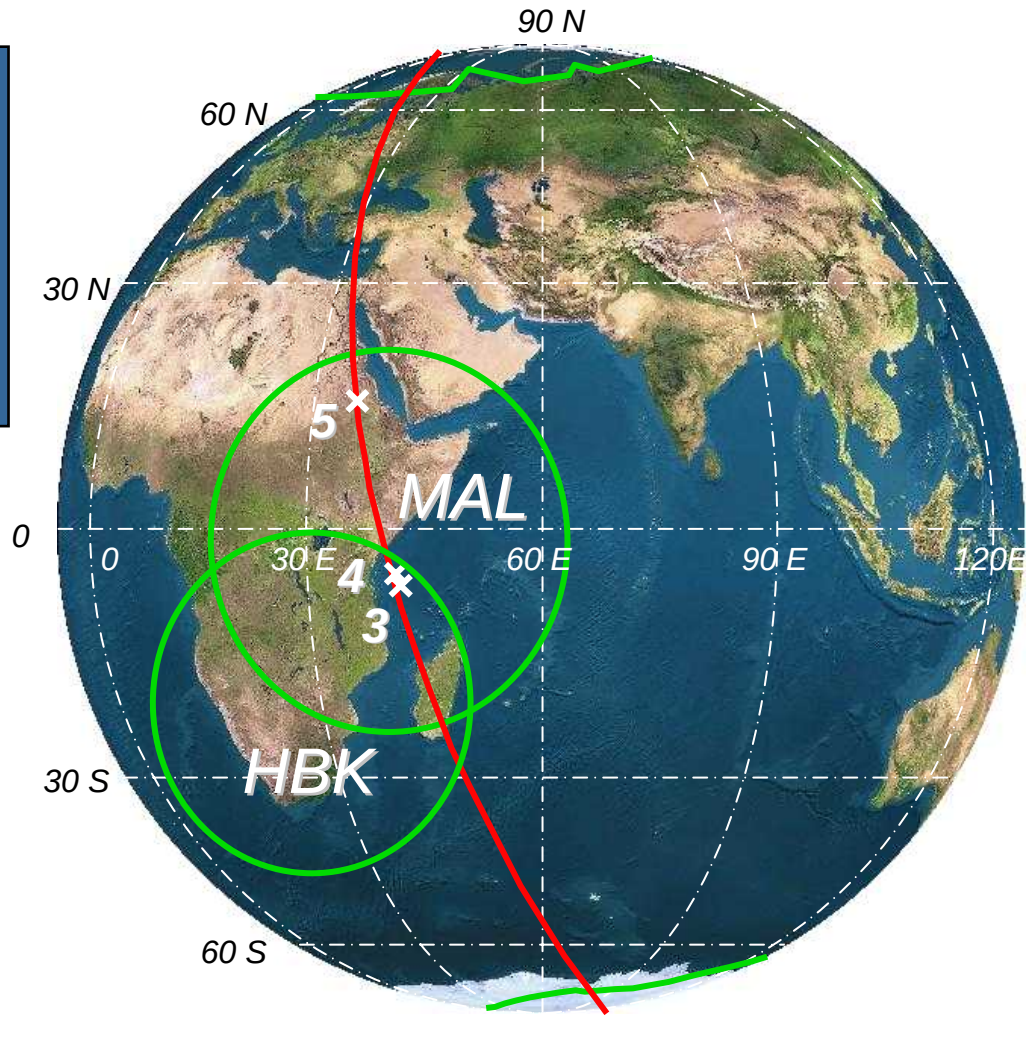
Legend (time, sec)
3 = First Restart (3561.0)
4 = SECO-2 (3574.3)
5 = NOAA-N Separation (3940.0)

Downrange Tracking Site(s)
MAL -> Malindi, Kenya
HBK -> South Africa



Range Calendar

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May 2005

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11 **Delta II NOAA-N** 03:22:01- 03:32:01PDT	12	13	14
15 *ER-Shuttle STS-114*	16	17	18	19	20 ***ER - Delta II GPS IIR-14***	21
22	23	24	25	26	27 *ER-Shuttle STS-114 Landing*	28
29	30 *HOLIDAY*	31				

03:22:01- 03:32:01 PDT local time for each launch opportunity

X Range Configuration
\\ Additional Launch Attempt(s)
\ Configuration Hold

/ Range Conflict
NOAA-N "Good" Launch Days
HOLIDAY

LAUNCH MANAGEMENT

Launch Day Management Flow

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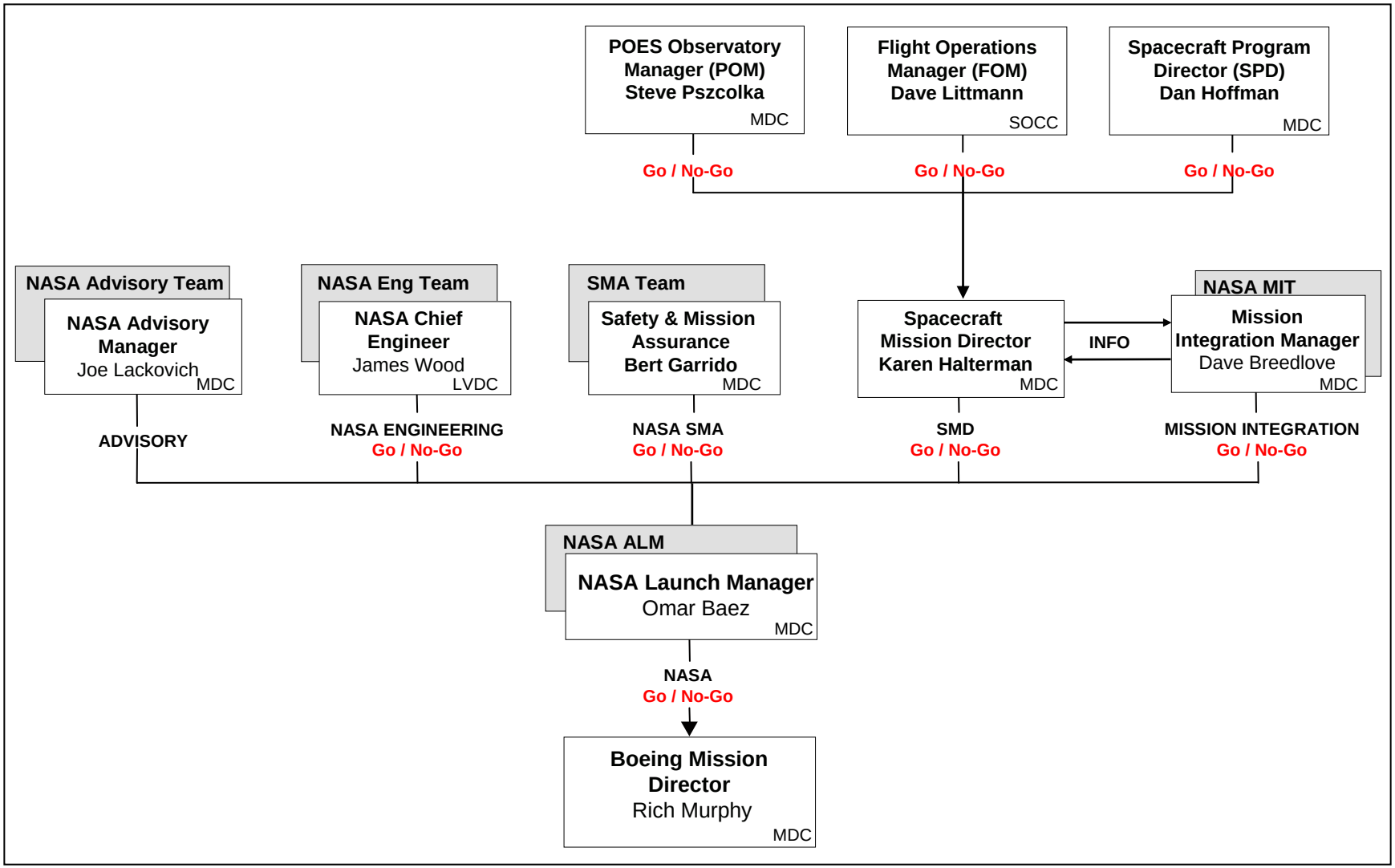

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Readiness Reviews

✓ Pre Vehicle On Stand	15 December 04	HB
✓ Launch Vehicle Readiness Review	26 January 05	KSC
✓ NOAA-N Mission Readiness Review	31 March 05	GSFC
• Launch Site Readiness Review	19 April 05	VAFB
• Safety & Mission Assurance Readiness Review	22 April 05	KSC
• Flight Readiness Review	5 May 05	VAFB
• Launch Mgt. Coordination Meeting / Mission Dress Rehearsal	6 May 05	VAFB
• Launch Readiness Review	9 May 05	VAFB

Summary/Conclusion

- Integration activities on track to support launch campaign operations
- Launch Site Integration activities and facilities are on track to support launch campaign operations
- No constraints to spacecraft mate, open items on track for closure prior to spacecraft mate

GROUND SYSTEMS

K. Amburgey
NOAA

Mission Readiness Review

Office of Satellite Operations
Ground System
and
Launch Readiness Status

K. Amburgey
SOCC Manager

Agenda

- NASA Flight Operations Team (FOT)
- Office of Satellite Operations (OSO) Responsibilities
- Ground System Functional Overview
- Satellite Operations Control Center (SOCC) Support
- NOAA-N SOCC Readiness Status
- NOAA-N SOCC Readiness Actions
- Summary

NASA Flight Operations Team

- Responsible for Monitoring Spacecraft Health and Status
- Responsible for Performing of On-orbit Verification (OV) Testing
- Responsible for the Generation, Modification & Execution of the Flight Timetable (FTT)
- Responsible for the Initiation of Contingency Operation Procedures (COPS) as required

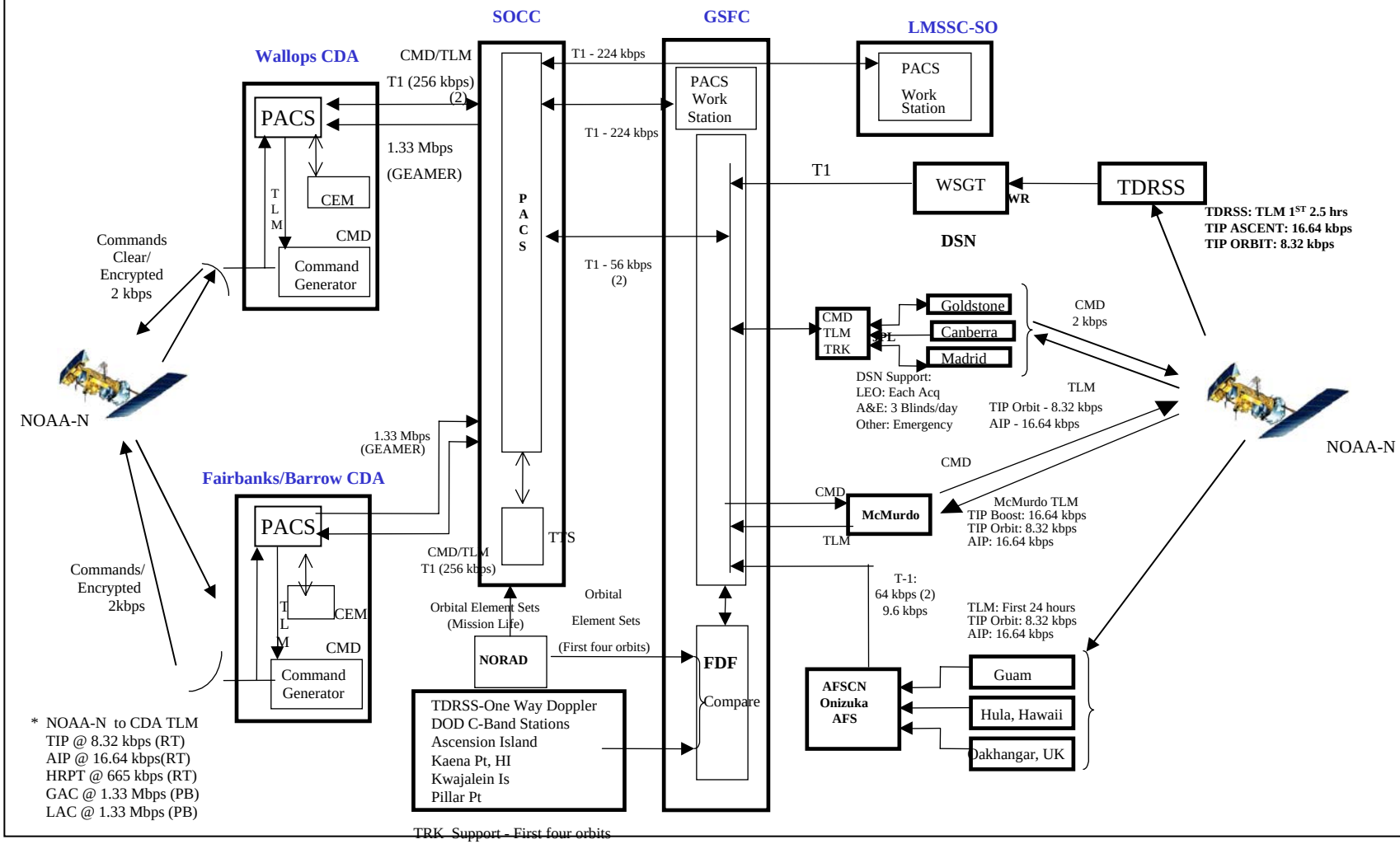
OSO RESPONSIBILITIES

- Support NASA Flight Operations Team (FOT)
- Configuration Management of Databases
- Maintain Flight Time Table
- Ready OSO Ground System and SOCC Facilities for NOAA-N Launch and Operations

Ground System Functional Overview

Ground System Functional Overview

NOAA POES Ground System Network Diagram



SOCC Support

SOCC Support

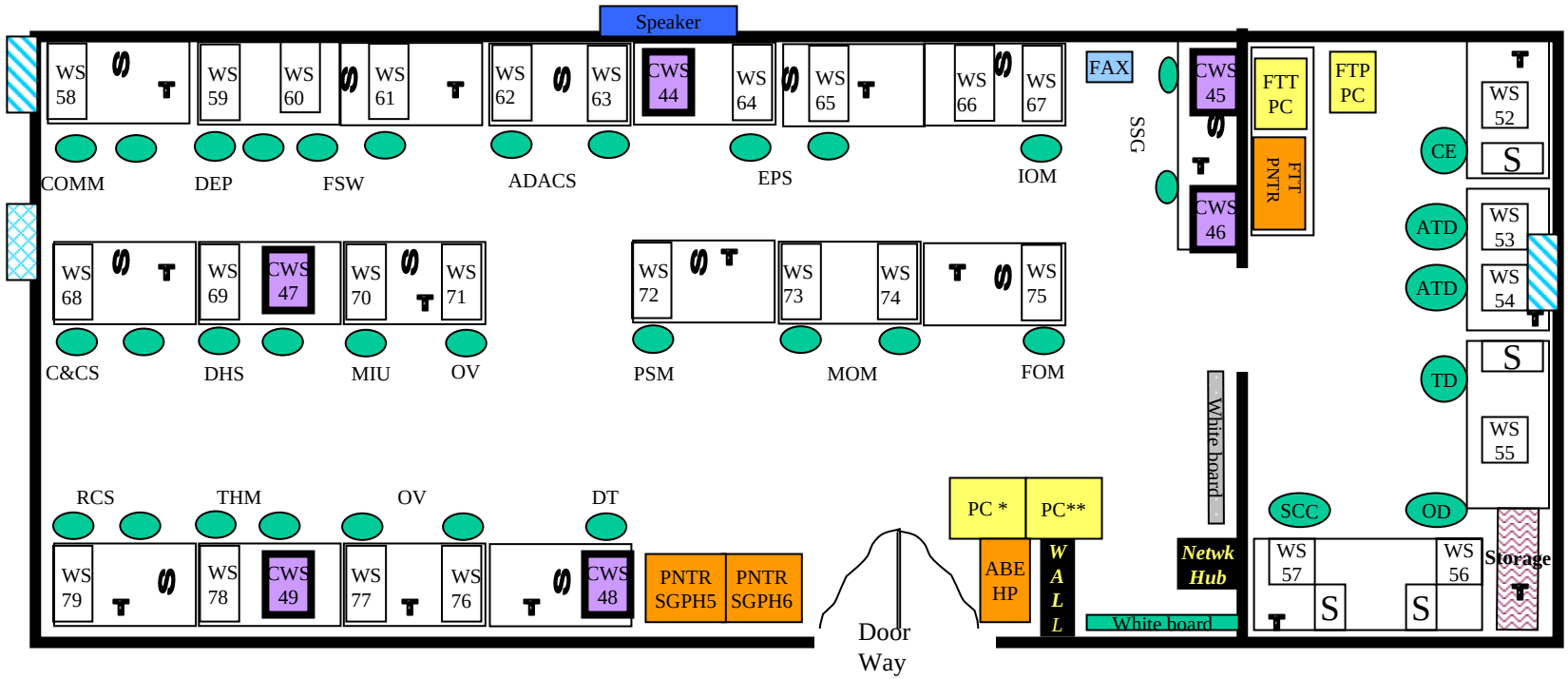
(1 of 3)

- Satellite Operations Control Center (SOCC)
  - **SOCC Polar Operations Area**
    - Maintains responsibility for “round-the-clock” command and control of all operational on-orbit POES spacecraft
  - **SOCC Databases**
    - Command, Telemetry, TLM Monitoring Pages and Command Procedure Development and Configuration Management
  - **SOCC Personnel**
    - Provides additional SOCC manning required to support ground contacts scheduled for the LEO phase
  - **SOCC Downstairs Launch Control Room (DLCR)**
    - Provides critical manning levels of the FOT in the DLCR during Launch & Early Orbit (LEO) including full complement of subsystem specialists.
    - Provides the ability to execute all activation and checkout activities for the spacecraft subsystems and instrumentation
    - Provides off-line engineering support to the spacecraft subsystems and instrumentation during all phases of test and checkout.

SOCC Support
(2 of 3)

- Downstairs Launch Control Room (DLCR)
  - Substantial renovations were made to the launch control room used for N-16 in 2000 as well as to surrounding office space to create the DLCR.
    - Incorporated facility features from the N-17 launch control room.
  - Modifications incorporated lessons learned from N-16
    - Provides adequate workstations and workspace for FOT
    - Better environmental controls for the room
    - Isolated area for commanding
    - Allows all FOT to be co-located in one room
    - Larger conference room created for launch meetings and break room
  - Room has been used successfully for all pre-launch activities

Downstairs Launch Control Room (DLCR) Workstation (WS) Layout For NOAA-N Launch



CE	Command Engineer
DT	Data Tech
SCC	Spacecraft Controller
SSG	Suitland SOCC Ground
PC*	McMurdo Remote Control PC
PC**	Graph Track PC
S	SCAMA Phones (16)
T	Telephone (15)

Chair
Printer
Countdown Clock
TV Monitor

Revision 14,03/16/05

Not to scale

NOAA-N SOCC READINESS STATUS

NOAA-N SOCC Readiness Status

(1 of 3)

- PACS (Polar Acquisition and Control System) Hardware/Software operational
  - Currently supporting 5 spacecraft: N-12, 14, 15, 16, 17
- PACS Software Upgrades
  - Processing of High-Speed Dwell data
  - Implemented MHS/MIU upgrades to handle new telemetry decommutation, dumps and compares
  - Implemented updates to support N/N' through LEO-T

NOAA-N SOCC Readiness Status

(2 of 3)

- New Hardware Installed and Verified
  - Pt. Barrow antenna currently providing HRPT in real time and limited supports taken for commanding and telemetry monitoring
  - MHS/MIU (Microwave Humidity Sounder/Microwave Interface Unit) Command Builder
  - Flight Code Maintenance Tool used to maintain flight software (FSW) images and develop special loads
  - Consolidated Workstations (CWS) in use to supplement offline analysis for engineers and at the Suitland ground positions.

NOAA-N SOCC Readiness Status

(3 of 3)

- Future hardware installation
  - Installation of 2nd POES Output Player Apparatus (POPa) at SOCC to be completed by 01 April. Will be used to display and record real time instrument data for analysis.
- Hardware & software will be frozen at launch minus 30 days

NOAA-N SOCC
READINESS ACTIONS

NOAA-N SOCC Readiness Actions

(1 of 2)

- SOCC Personnel and Facilities were readied for NOAA-N Launch by:
  - Participating in NOAA-N activities in conjunction with daily on-orbit operations
  - Actively participating in all NOAA-N end-to-end tests
  - Supporting NOAA-N T/V and SEPET testing by monitoring and analysis of data for database verification
    - Collected and archived N-18 ascent data on PACS
  - Conducting DSN proficiency tests and network simulations
  - Participating in Simulations and Dress Rehearsals
  - Conducting internal simulations to train EMOSS Personnel that will support launch.
    - 3 completed and 2 more planned
- Performing extensive database validation.
  - CM procedures in place and followed.

NOAA-N SOCC Readiness Actions

(2 of 2)

- Training and launch product validation conducted through simulations (SIMs)
  - SIMs were conducted to:
    - Train new members of NOAA/NASA engineering teams
    - Refresh training for returning members of FOT
    - Verify launch products
    - Verify databases
  - SIM on 3/17 included anomaly resolution
  - Remaining full team dress rehearsals:
    - 14 April 05* and L-2 will include all members of flight ops team. (* to include anomaly resolution)

Summary

- SOCC hardware is functional and ready to support NOAA-N
- SOCC software is functional and ready to support NOAA-N
- All SOCC flight ops team members have participated in pre-launch SIMs and training
- All SOCC flight ops team members continue to receive proficiency training and simulation time for launch support and are ready to safely support NOAA-N launch, activation and evaluation
- SOCC ready to assume operational responsibility of NOAA-N

PUBLIC AFFAIRS PLAN

C. O'Carroll
Public Affairs

National Aeronautics and Space Administration
Goddard Space Flight Center

PUBLIC AFFAIRS PLAN
POES NOAA-N SATELLITE

Cynthia M. O'Carroll

March 31, 2005

Public Affairs Responsibilities

- Goddard Space Flight Center (GSFC) - the lead NASA organization for day-to-day planning, implementation, and coordination of public affairs and outreach with NOAA and NASA Headquarters.

- Kennedy Space Center (KSC) - responsible for all launch preparations, photo coverage, the L-1 briefing, launch commentary and TV coverage originating from VAFB.

- National Oceanic and Atmospheric Administration (NOAA) - works with GSFC in the preparation and distribution of all media materials and the planning of media briefings. All responses to questions, news releases, fact sheets, and status reports are coordinated with NOAA.

External Communications

Mission Products

- Press Kit: NASA NOAA Products
  - NOAA-N Fact Sheet
  - Lithographs on the GSFC web site:
    - Sea Surface Temperature
    - Total Precipitable Water
    - Measuring Ozone with the SBUV/2
  - NOAA's Environmental Satellites Fact Sheet
  - National Environmental Satellite, Data, and Information Service Fact Sheet
  - National Weather Service Fact Sheet
  - GOES POES poster
  - NOAA-N Launch Profile

External Communications

News Releases

- Note-to-Editors - GSFC and NOAA PAO will issue a release to inform the media of the time/location of L-30 briefing.
- Overall News Release - GSFC and NOAA will issue a release about NOAA-N and the POES program on the day of the L-30 briefing.
- Pre-Launch Release - HQs and KSC will issue a release on L-7 to announce the L-1 press briefing, press logistics for the briefing and the the launch.
- Post-Launch Status Reports - GSFC and NOAA will jointly issue status reports after the launch.

External Communications

Television and Web Coverage

- NASA TV - KSC PAO will arrange TV support and launch coverage at VAFB.

- Video File - GSFC PAO has produced a video file which be downlinked to the news media for the L-1 briefing, and on the day of the launch. The video file will include interview with NASA and NOAA project managers and science and spacecraft animation.

- Live Web Cast - KSC will present a live web cast on L-2 at VAFB which will include the USAF Launch Weather Officer, the Launch Director and the NASA NOAA-N Observatory Manager.

External Communications

Pre-Launch Briefings:

- L-30 Briefing - will be held at the Department of Commerce in Washington, D.C. on April 28 at 11:00 a.m. EDT.
  - MC: Gary Davis, Director, NOAA's Office of Systems Development
  - VADM Lautenbacher, NOAA Administrator
  - Greg Withee, Administrator, NOAA's Satellite and Information Service
  - D.L.Johnson, Director, NOAA's National Weather Service
  - Eumetsat Rep

External Communications

Pre-Launch Briefings:

- L-1 Launch Briefing - An L-1 pre-launch news conference will be carried live from VAFB on NASA TV on May 10 at 4:00 p.m. EDT, 1:00 p.m. PDT

  - Moderator: George Diller, KSC PAO
  - Michael Mignogno, NOAA POES Program Manager, National Environmental Satellite, Data and Information Service
  - Omar Baez, Launch Director, NASA KSC
  - Kris Walsh, Boeing Director of NASA Programs
  - Karen Halterman, NASA GSFC Spacecraft Project Manager
  - 30th SW Launch Weather Officer

External Communications

Post-Launch Events and Services

- Contingency Briefing - If a launch contingency should occur, a briefing will be targeted for 2 hours after the contingency or as soon as significant information is available. The briefing will be held at VAFB and shown on NASA TV.

- Post-Launch Status Reports - GSFC PAO will coordinate all post-launch status reports with NOAA throughout the check-out period. These status reports will be issued as news releases and will be posted to the GSFC external website.

- Goddard Code-A-Phone and External Web Page - Information regarding the NOAA-N launch will be placed on the GSFC external web page and on the Goddard Code-A-Phone within one half hour of the launch.

External Communications

Guest Operations

- Managed by KSC, NOAA, Boeing and VAFB
- Invitations to be mailed by NOAA on to approximately 150 invitees
  - Guest Information Center will be based at the Embassy Suites in Lompoc
  - Tour of the VAFB Space Museum for VIPs
  - Briefing and dinner at the Pacific Coast Club at VAFB
  - Launch viewing will be near the weather station
  - Educator Conference run by the Endeavour Center that promotes space activities to teachers in the K-12 classrooms

Internal Communications

- Goddard News will include an article about the successful launch.
- GSFC web page will post the launch news release and a photo of the launch. It will also have links to the electronic press kit.
- The GSFC Public Services Office will inform employees of the mission status via the Code-A-Phone, Dateline Goddard, the Center gate signs, and the internal website.

More Information

- For more information about NOAA-N and the POES Program:
  - http://goespoes.gsfc.nasa.gov
  - http://www.noaa.gov/satellites.html
  - http://nws.noaa.gov